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THE CARE OF THE PARALYSES OF POLIOMYELITIS.[1]

By JEAN MACNAMARA,
Melbourne.

THE interests of orthopædists in any community vary with conditions and diseases which induce potential and actual crippling in its population. In Great Britain orthopædics has developed in dealing with victims of accidents and war injuries, rickets and tuberculosis of bone and joint. Paralyses following poliomyelitis have been a small percentage of the conditions for which orthopædic care has been needed.

In Australia, however, the incidence of repeated epidemics within the last two decades has shown that the eastern States, especially Victoria and Tasmania, share with New Zealand, the Scandinavian countries and the States on the eastern seaboard of North America the unenviable distinction of being centres where epidemics of poliomyelitis are to be expected repeatedly. On the members of this association rests a double responsibility.

First, they have to lead medical and public opinion to appreciate the urgency of epidemiological and clinical research for further knowledge of the mode of spread of poliomyelitis as it occurs in Australia. It is necessary that orthopædists fight the attitude of apathy and hopelessness exemplified by the following statement by Professor F. M. Burnet[2] from a "Health Bulletin" issued in 1945 in Victoria:

> The practical problem of preventing infantile paralysis has not been solved. It is even doubtful whether it ever will be solved. It may be that we shall have to recognize the possibility of infantile paralysis as one of the normal perils of childhood—one, by the way, which is far less important in regard to loss of life and permanent crippling than the chance of road accident.

Professor Burnet did not state on what studies or statistics his statement on crippling is based.

As the people who see the effects of poliomyelitis every day, the members of this association have to accept the second responsibility of demanding the provision sufficiently early of skilled and continued care to prevent or minimize the crippling of the persons affected, and of stressing the economic saving in invalid pensions which results from the provision of that care.

In his book, published in Philadelphia in 1867, Charles Fayette Taylor laid down the first basic principle: that the role of the doctor, nurse or attendant is that of a humble assistant to Nature. Taylor stated:[3]

> All cases tend towards recovery. Nature does with comparative rapidity what she can, and would often do much more if permitted. Many a theory has been triumphantly established by happening to be tried at a time when nature is sure to be using her reserve forces to repair damage—and always with more or less success.

To instil into nurses, parents and physiotherapists this humble approach—that of a gardener caring for delicate plants—it is wise to use the word "care" instead of "treatment".

The future of patients paralysed by poliomyelitis depends upon two factors: (*a*) the degree and extent of the destruction of the anterior horn cells of the spinal cord, (*b*) the perfection of detail of the care given from the onset of paralysis. If poliomyelitis in the human equalled in the severity of its lesions the disease produced in the monkey by the intracerebral inoculation of a monkey-adapted virus, the first factor would be more important; the second, less; but poliomyelitis, as it is occurring at present, rarely causes death of all the

[1] Read at a meeting of the Australian Orthopædic Association, Brisbane, June, 1946.

neurones in any part of the cord. The microscopic pathological changes are characterized by the patchy distribution of the damaged cells. While vascular changes may be general throughout the cord and cell destruction most intense in some areas, even in these some anterior cells appear healthy. The clearing up of the inflammatory process has advanced by the end of five weeks and is usually completed by the end of eight weeks from the onset of paralysis. Unlike *encephalitis lethargica*, no focus is left to smoulder and to light up again after years of quiescence; nor will any process of strangling of surviving cells by scar tissue occur, for the scars are neurological only. Usually the degree and extent of paralysis in the first week of its onset is greater than it will be at any other period. If 100% of the motor cells innervating all the fibres of any muscle group had been destroyed one could not anticipate any recovery; but, because the lesions are patchy, because a percentage of cells usually survive, the prognosis for recovery is better and therefore the responsibility is greater to provide the opportunity. With the mild cases the danger lies in the fact that the term "mild" is often construed as "unimportant" and early care is not sought or provided—and the opportunity of rapid complete recovery is lost. The large number of patients with mild paralyses among the cases occurring at present should have first priority of available care. It is just as important to assist muscles of 70% to 80% efficiency quickly to become 100% as to care for patients with severe paralyses.

In an early paper by Lovett appears the advice to any physician caring for patients to ask himself the following questions: (*a*) What are you trying to do? (*b*) Is it worth doing? (*c*) Are you doing it?

Considering the answer to the first question, we cannot restore to life the cells which have died. We can do little, if anything, to hasten the natural tendency to recovery in the affected spinal cord; but we can, by taking care of the muscles innervated by surviving cells, by shielding them from additional injury, give the survivors the opportunity to take over the work which, before the lesion occurred, they shared with the cells which the lesion has destroyed. We know that just as there are more glomerular units in the kidneys than are called into simultaneous action during health, so most people rarely use, at any one time, all the fibres of any muscle group. Each individual fibre, when it contracts, contracts to its utmost; but all are not called into action unless the effort demands them. As expressed by Wood Jones:[2] "Muscles go full steam on half boilers, not half steam on all boilers." Development of the "reserve fibres" is obvious when a person takes up labour involving repeatedly maximum efforts, as is seen in the development of the hand muscles of milkers and of the shoulder and back muscles of labourers. Labourers do not begin life equipped with a greater number of neurones or of bigger or better muscle fibres than do the children who will later become clerks, but by repeated stimulation they fully develop muscle fibres which in other people function less frequently. Because of the provision of more neuro-muscular units than are usually required in health, when some of the cells innervating any muscle are destroyed by poliomyelitis, unless the proportion is high, the survivors may be adequate to take over the function of the units destroyed by the lesion and normal function of the muscles may be restored. They cannot do this if further handicaps are added. Unfortunately, in cases in which no care has been given even after minor degrees of paralysis have occurred, two factors will operate to handicap the natural processes of recovery: (*a*) fatigue of the neuro-muscular unit and (*b*) stretching of surviving muscle fibres.

Stretching of Weakened Muscles.

Even normal muscle fibres, when continually stretched, lose temporarily their contractile power.[1] The effect of extension is greater on muscles partially paralysed and, as stated by Taylor, a slight degree of continuous or comparatively sudden extension, which may be harmless in a healthy muscle, may be capable of destroying the feeble irritability and power of a muscle partially paralysed. Appreciation of this fact, that functional disability will be added to the result of the lesions of the disease, if affected muscles are continually stretched, is fundamental to the treatment of patients suffering from poliomyelitis; and conversely, if a muscle is to have the opportunity of achieving the maximum recovery of which it is capable, the bones on which it acts should be placed in such a position that the muscle will be continually relaxed. This principle was emphasized in the writings of Taylor in 1866, was taught by his contemporary in England, Hugh Owen Thomas,[3] and was the lifelong teaching of Sir Robert Jones. This principle guides the position in which the limb should be held. At the onset of paralysis, when it is too early to decide which muscles have been most affected, we can favour by relaxation the muscles of greatest economic importance.

We aim at the return of the patient to the shape and power of a normal human of good posture. It is wise therefore in early cases of generalized paralysis to arrange by splinting that the muscles essential for the erect position are favoured—the hip extensors, the quadriceps, the trunk muscles. In the lower limb the hip extensors, abductors, the quadriceps and calf muscles are more valuable than their opponents, and if affected equally should be favoured. In the upper limb the intrinsic muscles of the hand, the dorsiflexors of the wrist, the supinators and the shoulder abductors merit the first opportunity. Any splinting to favour them by relaxation must be compatible with good posture of the whole patient. For example, in 1925, in Victoria, it was the practice when a deltoid was alone involved to fit the patient with an abduction splint as had been advocated by Colin MacKenzie. In this splint the deltoid was cared for while the patient could walk about. With adults this procedure is safe, though it is wise at night to have the deltoid protected by other means. In the treatment of young people the asymmetrical splint, if used early and all day, does not encourage good posture. This practice has been altered—we obtain now two splints for a child with a paralysed deltoid: first, the complete frame to hold the child while lying in the normal erect position, the arm being abducted; second, the ambulatory abduction splint. In this the degree of abduction is determined by the amount of involvement of the scapular muscles, especially the rhomboids. It is not useful to support the upper arm at a right angle from the trunk if the scapula is displaced laterally—support at abduction to 60° protects the deltoid without discouraging the rhomboids.

The complete frame is used alone during the first few weeks until one can be sure that trunk and lower limb muscles are normal, then the hours of daytime spent in the ambulatory splint are cautiously increased, the frame being used for the rest of the twenty-four hours.

As power may return to one group of muscles more quickly than to their antagonists, the splinting needs frequent modification. When the splint is fitted, the position may not favour the outward rotators of the shoulder more than the inward rotators. After a few weeks it may be obvious that the latter are the weaker group and the splint is modified to help them. Similarly at the elbow, the initial position may favour the triceps, but a few weeks later recovery of power may make the triceps relatively stronger than the elbow flexors. For at least some part of the day the flexors should be favoured to keep the balance between the two actions. In a severely paralysed arm elbow flexion is likely to be more valuable, but in a mild case with good prognosis for recovery it is often wise to give the triceps the initial advantage while the patient is still in bed, for the complete recovery of the triceps is important to a labouring man. Appreciation of the relative working value of each group, combined with the amount of weakness of that group in comparison with the antagonists, determines the optimum position at any particular stage.

If paralysis is localized to one muscle group, such as the dorsiflexors of the foot, the only modification of the splint is demanded by the patient's growth, the affected group being consistently favoured.

Fatigue.

I am convinced, after twenty years of observing paralysed muscles, that in the milder cases fatigue is responsible for more crippling than are the lesions of poliomyelitis. To allow partially paralysed muscles in a lower limb to carry weight throws away their chance of rapid recovery. I would lay it down that for any involvement of muscles of the lower limbs weight-bearing should be forbidden in the first two to three months and then most cautiously allowed.

The epidemic of 1945-1946 in Victoria has furnished, unfortunately, examples of young adults limping about from a few weeks after the onset until increasing weakness and wasting have forced them to seek attention. The disability has increased not because more cells have died, but because muscles striving to recover have been flogged past their fatigue point and have been stretched. It is interesting, in Lovett's writing[6] to trace how his attitude to fatigue altered as his experience deepened. In his early publication he advised that when the lower limb had been involved braces should be fitted as soon as possible and the patients put on their feet. In 1917 he stated:[7]

> No one was more skeptical than I of the treatment by prolonged recumbency. I have become a thorough convert to the practice, not only in recent cases, but in old cases where it is desired to secure the maximum of muscular development. I believe that an appreciably weakened muscle can be given all it should do by being given therapeutic exercises without weight-bearing; and I think, moreover, one should be exceedingly careful not to overdo this. I believe that, when the muscles of the trunk and lower limbs are involved, the number of cases in which recovery is to be obtained is very greatly extended by keeping the patients from walking during the first year, and in many cases during the second year also.

Taylor[2] expressed his convictions thus:

> *Recuperative Period.*—Here we arrive at a very critical period. A certain amount of recovery has taken place with a corresponding amount of improvement in some at least of the muscles. How shall we keep up this recuperative process? Every organ is strengthened by the proper use of its function. Whatever power there may be in a muscle, after a certain time, needs to be used in order to develop more. But there may not be enough for the purposes of locomotion or actual use. Evidently, then, we must contrive to afford the muscles opportunity to act within their capacity, alike avoiding inactivity or overaction, until their development has reached a point where they are capable of being made available in sustaining the weight of the body and in locomotion. We must furnish the muscle an exercise that shall not exceed its capacity, and not till the powers of the muscles have been developed till they are equal to sustaining the weight of the body, should they be required to sustain it. There is no physiological principle more clear and simple. The legs of a paralysed child in relation to its body may be compared to those of an infant called upon to support the trunk of a man. They cannot do it and they should not be allowed to attempt it until they have grown equal to their load.

My experience has convinced me that no arbitrary time limit can be set to the process of recovery of partially paralysed muscles; that muscles have no cognizance of calendar months. The factor which determines the degree of power to which a muscle may attain, given favourable conditions, is the degree of the initial damage, the percentage of cells surviving, not the passing of the first or second anniversary. We order braces earlier than we used to, not to allow unrestricted walking and sitting, but as a help to the physiotherapist in teaching standing posture and to allow a daily change to the vertical position to obviate kidney stasis. In the treatment of adults whom circumstances often force to walk before their muscles are ready, braces are fitted to reduce the handicap to the quadriceps and the dorsiflexors. With these reservations braces are not regarded as part of the early care, but as useful appliances for the rehabilitation of severely paralysed patients.

With adults the optimum positions can be maintained by splints of plaster of Paris or wood or wire outlines, but such splints are not effective for children, who, as the stiffness lessens, sit up and stretch affected buttock muscles, crawl or hop or try to walk dragging the splinted limb. For this reason the frame used in Victoria serves as a means of rationing the activity of children. In the mild cases, if the muscles are ready for two-hour periods of walking, the frame ensures rest for the remaining twenty-two hours.

By its use one can ensure that the liberty allowed is within the capacity of the patient's muscles. Mothers quickly learn when the fatigue point has been passed, detecting a saving of the limb which had been paralysed or a tendency of the knee to hyperextend. Most mothers are grateful for effective means of grading the child's activity.

Auxiliary Methods.

Warmth is important. Recovering muscles are sensitive to cold. In bed or in a perambulator it is easy by artificial means to maintain an even temperature. It is difficult to keep a paralysed leg warm in a walking splint. When tenderness and stiffness are marked and when adequate physiotherapy is not available, saline baths allow joint movements which discourage stiffness. The Hubbard bath is large enough to allow movements, and for apprehensive patients has its place in physiotherapy. We have found, however, that a sulky *tibialis anterior* demands protection even during time spent in the bath.

Pool Therapy.

The vogue for "pool therapy" has caused many to lose sight of essentials, to evade an honest answer to Lovett's questions: "What are you trying to do?" and "Are you doing it?" Exercise in pools provides pleasure and entertainment, assists normal muscles to become stronger, and is useful for the final stage before complete recovery of endurance as well as recovery of power. The routine use of pools as "therapy" has, I consider, done more harm than good to paralysed muscles in that accurate estimation of the fatigue point is impossible. Too often some "magic" powers of the pool are considered sufficient to make up for insults to the muscles it is designed to help.

Within the last year visitors to Victoria have commented on the persistence for several weeks of spinal rigidity, pain on passive stretching of the hamstrings and rounding of the back. This sign has occurred irrespective of splinting. It has been more frequently observed this year than in any epidemic since that of 1929. I regard it as a persistence of the sign described by Amoss in the preparalytic stage and as evidence that the reparative processes in the spinal cord have taken longer than in the cases in which it is not observed. For the future posture it is important that the hamstrings become their normal length and the back mobile, but in the early stages this stiffness is useful in ensuring a longer rest in bed. If buttock muscles have not to be considered, posturing the patient to bring the hamstrings to their full length hurries its disappearance, but good physiotherapists have little trouble with it after the first few months.

The Physiotherapists and Physiotherapy.

With the experienced physiotherapists lies one of the solutions of the after-care of infantile paralysis. Twenty years ago the physiotherapist's sole responsibility was muscle reeducation—the art of grading exercise for the muscles short of the fatigue point. To that responsibility has now been added the recording of tests of muscle power, the production of plaster bed boots, the fashioning of splints to care for the valuable hand muscles, the supervision and adjustment of frames, the instruction of the mother in the details of care. In country districts the physiotherapist is often the only link between the patient and the splint maker. She has become a technician in conservative orthopædics as well as a physiotherapist. In the past difficult year in Victoria the patients from country centres where a physiotherapist has been available have shown her value. As an association we

should insist that any girl contemplating work in the country has the opportunity to go equipped for the responsibility she will have to shoulder. It would aid her work if instruction in the care of paralysed muscles were allotted more time in the curriculum of medical students. Poliomyelitis is more important to the Australian doctor than rare nervous diseases the medical student studies thoroughly, such as disseminated sclerosis or amyotrophic lateral sclerosis.

Summary.

1. By muscle examination, discover and record the degree and extent of paralysis. If the patient is sore and apprehensive the details may have to be postponed.
2. Obtain or make temporary splints to ensure good posture of the whole patient and protection for the most valuable muscles—intrinsic muscles of the hand, the deltoid, hip extensors, quadriceps.
3. Order or make splints which will be comfortable and effective in maintaining good posture, and if paralysis is generalized favour the muscles essential for standing and walking; if localized, protect the affected group.
4. Make the patient or parents realize that if muscles of the lower limbs are affected, weight-bearing and walking will increase the weakness and wasting.
5. Realize, and make the patient realize, the handicap which even a slight loss of power in the calf muscles means to a boy with athletic ambitions, or in the deltoid to a farmer.
6. If the patient is a child, arrange that the frame provided is effective in controlling him so that his activity can be graded.
7. Fit the frame as soon as possible so that the child becomes accustomed to it at a stage when he is grateful for its support.
8. If the patient is sore and stiff, saline baths will comfort, but it may be necessary to provide protection for certain muscles in the bath.
9. Take the opportunity in children of splinting to correct any antecedent defects such as knock-knees or everting feet.
10. Arrange for gentle passive movements of joints to be carried out as frequently as is necessary to prevent stiffness.
11. Tell the relatives how to obtain a perambulator or carriage so that the patient can share in the family life and be out of doors as much as possible.
12. Stress the importance of warmth.
13. For children of school age arrange for postal education. For older people encourage education in some subject which may enable the patient to take a better position than he contemplated before his illness.
14. If possible, arrange for regular visits from a physiotherapist.
15. Arrange that at least your alternate visits are made with the physiotherapist and give her the backing she needs to make her work effective.
16. Accept your responsibility for the anticipation of deformity.
17. Encourage the adult patient to continue the régime at least long enough to give his buttock and quadriceps muscles a chance of recovery.
18. Arrange, if you can, for the relief of economic pressure, which often causes young adults to lose their opportunity.
19. Realize that when recovery is complete Nature, not you, has achieved it. Judge how you have helped her at the end of the growing life of a child.

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SPECIAL CHARACTERISTICS AND REQUIREMENTS OF ORTHOPÆDIC SURGERY IN INDUSTRIAL PATIENTS.[1]

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WHEN one deals with orthopædic affections in industrial patients there are several factors which present themselves with a prominence not met with in the case of the ordinary private patient. One has three interests to consider: (*a*) the patient, (*b*) his insurer and (*c*) the patient's own medical attendant.

In this work especially, as indeed in all medical practice, one must consider the patient as well as his disease; varying types, races and temperaments present themselves and must be dealt with according to their special characteristics. Generally speaking, the injured worker is as anxious as anyone else to be restored to health and to return to his job in the shortest possible time; but there are exceptions and these exceptions tend to belong to special races and special occupations.

Occupying a unique and dishonourable position are the Maltese, who in Sydney at least, in comparison with their numbers, are notorious for their malingering propensities. The Italians also present a peculiar temperament; when well they are hard, honest workers, but when once sick or injured they throw up the sponge and it is almost impossible to convince them that they will ever be fit for work again.

Again, some occupations seem to attract the more undesirable members of the community and to provide an undue proportion of fraudulent claimants. One does not encounter many pure malingerers. One is apt to encounter the desire to prolong the period of compensation payments, and a reluctance to return to work on the part of a man who has suffered a genuine injury from which recovery is complete.

As one would expect, the more highly skilled and the more responsible the position a man occupies, the greater is his desire to return to it in the speediest possible time.

In industrial cases it is of paramount importance that a most careful history should be taken and, further, copies of all letters and certificates preserved. One should note the exact manner in detailed fashion in which an injury was received, the height from which a man fell, the weight of an object which fell on him, or the force with which anything struck him, whether and for how long the patient carried on with his work after receipt of the injury, and particularly whether there was any previous disability in the affected region. Reports should be phrased in language which is understandable to the layman, tell him not of a *talipes equinus*, but of a drop-foot; remember that the insurer is more interested in the prognosis and the treatment of the patient than in terminological exactitude of scientific diagnosis. He will not be interested in a lengthy discussion of differential diagnosis; it may even at times be better to be definitely wrong than indefinitely right. Much of what I have said in regard to the giving of reports applies with equal truth to the giving of evidence. After all, one gives evidence with the purpose of assisting the court in arriving at the truth, and if that truth proves to be unpalatable to those who have brought you to give evidence, the fault is their own in calling you. It is regrettable to see, as one sometimes does, medical men in court playing the part of advocate instead of merely presenting the plain medical facts as they see them.

[1] Read at a meeting of the Australian Orthopædic Association, Brisbane, June, 1946.

In New South Wales the *Workers' Compensation Act* has now been in operation for twenty years, and I believe that the benefits both in the way of compensation and payments to the injured worker and in the provision of medical services are greater than in the other States. There is thus an added inducement for the insurance companies to have the workers restored to industrial efficiency as quickly as possible, to shorten the period of incapacity, and naturally, therefore, to secure the most efficient medical and surgical treatment. They are also, of course, interested in avoiding the undue prolongation of a claim and in exposing fraudulent ones. The result is that in a high percentage of cases workers are referred to specialists for opinion and advice. The average patient definitely appreciates being sent to a specialist for an opinion and usually, but not always, his own doctor shares his attitude; most general practitioners are really glad to welcome a word of advice or suggestion; one meets with the odd individual who resents any doubts being thrown on his infallibility and he is the full brother to the man who, too, resents his sad results being dragged into the full light of day.

Two types of patient with whom one meets in this class of work and who are not usually encountered in ordinary practice are the fulsome patient and the suspicious patient. The fulsome patient is so glad he has been sent to you; everyone has told him that you are the best man in Australia, and now that he is consulting you he knows his condition, which has baffled the rest of the profession, will soon be put to rights, and generally he is correct, because most usually this fulsome gentleman has nothing the matter with him. The suspicious man believes that you are an underhand agent in league with the insurance company to deprive him of his just rights. His history is dragged from him with the greatest reluctance, and he resents and is apt to resist clinical examination. He, however, may be quite genuinely disabled as well as suffering from an overdose of "red" politics.

As regards the actual treatment of orthopædic conditions in industrial patients, there are no notable differences as compared with their treatment in the rest of the community. Premium is certainly to be set on function rather than on appearance. Injuries to fingers are excessively common in industrial work, and frequently the question of amputation arises. The object of primary treatment should always be to save as much as possible of every digit; it is at a later date that one has to decide between amputation and the retention of a stiff digit. Women will nearly always prefer to retain the stiffened digit, a young man will often prefer to lose it and to acquire a motor cycle out of the additional compensation obtainable as a result of its loss. Inquiry should always be made as to the exact details of the patient's occupation, and if it entails working with the hands in proximity to moving machinery it will usually be wise to sacrifice the stiffened member.

The ununited fracture of a scaphoid bone in the wrist offers a serious problem in industrial patients. What is one to do with a patient who has been treated for a primary fracture of the scaphoid and in whom union has failed to occur? Disability there is, but the question is, how much. We all know of many patients in whom the presence of an ununited scaphoid is discovered accidentally and who in its presence for many years have done hard manual labour without difficulty and without complaint. These people when cross-questioned will often admit to no greater degree of disability than is stated by the remark that the wrist is not quite so strong as its fellow. Are we therefore to operate on the patient whose scaphoid has failed to unite? Or are we to leave him alone? He is not inevitably condemned to the development of arthritic changes in the wrist and carpus in the presence of persistent non-union. If we decide to attack the condition operatively we must still realize that we have not yet attained the full solution of its proper surgical treatment. My own view is that the insertion of a bone screw followed by prolonged and adequate immobilization has thus far given the most promising results, definitely better than multiple drilling or the insertion of a bone graft. However, I see no reason why every patient with non-union of this fracture should be subjected to operation; many people can, and do, go back to laborious work in the presence of persistent non-union of this bone.

The present popularity of the diagnosis of prolapse of the *nucleus pulposus* bids fair to produce an important industrial problem. There is a fashion in disease just as there is in women's hats, and the rage for the diagnosis of this disease has reached its limit and scores of unfortunates are being subjected to operation on scant and sorry evidence. Much has been written about this operation and its indications. I await a paper by one of its exponents that will tell me what percentage of patients, if any, who have been subjected to this operation have returned to hard manual labour.

Operation is sometimes performed on industrial patients in cases in which in other walks of life advice against operation would have been given. There is a class of patient who is unwilling to return to work so long as he possesses a visible abnormality to which he can point. A case in instance is the ruptured long head of the biceps. Many untreated patients with ruptures of this tendon regain excellent function and suffer from but scant diminution in the strength of the arm, insufficient in amount to prevent the performance of laborious work. However, many of them, noting the visible descent of the muscle belly and the abnormal contour of the limb, demand operative interference. Admittedly, the results of operation are eminently satisfactory, but I would never advise a patient that such an operation is necessary.

One of the greatest difficulties is to determine what constitutes aggravation of a preexisting disability. It is the custom of our courts in New South Wales to cast the net very wide in this respect. This is exemplified in the case of loose bodies in the knee or elbow joint. A man's joint locks on the performance of some sudden movement, an X-ray examination reveals the presence of preexisting loose bodies, doubtless present long prior to the incident described. Such a patient always succeeds in his claim for compensation and for the medical expenses of the operative removal of these bodies.

Flat-feet furnish a steady stream of applicants for compensation on the grounds of aggravation, for who can say that any occupation involving prolonged standing will not aggravate this condition?

The result in actual practice is that the vast majority of orthopædic conditions encountered in industrial patients become the subject of compensation payments. Indeed, to the uninitiated some of the claims that have been upheld are, to say the least, surprising. A man has received compensation for being injured at the union picnic. There is at the moment one claim as yet undecided of a wharf labourer who was discovered stealing from the crew's quarters and was promptly laid out by the irate victim of his theft.

SUDECK'S ATROPHY.[1]

By H. A. SWEETAPPLE,
Sydney.

I AM afraid that what I have to say about Sudeck's atrophy will leave a sense of disappointment in those of you who expect an exposition of the subject based on personal experience and full of wise saws and modern instances. I accepted the secretary's commission three or four months ago, when the date of this meeting seemed satisfyingly remote, and I thought that I should be able to find many comprehensive articles in the library. The first fact that emerges from my researches is that Sudeck's atrophy does not attract as much attention from surgical men of letters as one would expect. I have not been able to collect any recent personal cases, not because the affection is uncommon, but because I have not had access to the necessary material in the past twelve months.

[1] Read at a meeting of the Australian Orthopædic Association, Brisbane, June, 1946.

Sudeck's atrophy, which has many pseudonyms that I shall mention later, is a condition usually occurring in the hand or foot, resulting from minor trauma and leading to pain, joint stiffness, vasomotor changes and bone atrophy out of all proportion to the causative injury.

Clinical Features.

The clinical features may be best presented by describing the course in a typical case I remember about ten years ago.

The patient was a dockyard worker, aged about thirty years, who jumped down from a hatch coaming—a height of about eighteen inches—and landed with his right foot on an iron stud projecting from the deck. He was wearing sandshoes at the time. He felt the acute pain one would expect, under the navicular region of the foot and the skin was not broken. He was able to complete his day's work, but by the evening the foot was generally swollen, and he was still unable to work three years later when I lost touch with him. At first the injury was considered a minor one, because X-ray examination failed to reveal any fracture, and he was encouraged to use contrast baths, and to remain ambulatory. The foot remained swollen and painful, and he could walk only with the aid of a stick. In a short time—a matter of a few weeks, when such an injury might be expected to have recovered—the whole foot and the malleolar regions were a dusky red, the ankle tarsal and toe joints were stiff and painful to move, and the swelling had not subsided. A check X-ray film taken at this time revealed generalized decalcification of the bones of the tarsus, of the lower ends of the tibia and fibula, and of the cancellous parts of the metatarsals.

In the belief that ambulatory treatment was the only treatment, the patient was fitted with a walking plaster. This enabled him to walk in more comfort, though the foot was still painful. He wore a succession of walking plasters for many months, with periods between of walking without this aid as a test of recovery. He made no improvement, and the foot was always stiff, dusky and painful, and in fact his condition became worse.

Naturally and inevitably he was suspected of malingering; but he was a man of character, and I always felt sure that his complaints were genuine.

Sometime in the second year, when he used to walk into my room painfully and laboriously using two sticks, I belatedly (because as I say, the condition does not appear often in the journals) tried to discover something about Sudeck's atrophy. An article on the subject by Professor Turner, of Leningrad, about this time mentioned the occurrence of localized tender spots in the course of superficial peripheral sensory nerves, and I found one such spot just above the medial malleolus. Following the advice of Professor Turner, I injected this with a few minims of a 60% solution of alcohol. This tender spot must have been in the course of one of the terminal branches of the saphenous nerve, for in addition to the immediate severe local burning pain of the injection, he felt pain in the great toe, which shortly became numb. I repeated this procedure several times at weekly intervals, but it had no effect on his pain, swelling or stiffness.

The condition dragged on, and it was proposed to perform a periarterial sympathectomy; but this was not done, and my last recollection of the patient is of a man walking out of my room laboriously, slowly and painfully, helped by two sticks.

This man's case presents all the features described in all the articles I have been able to read. All authors emphasize the (usually) minor nature of the trauma, though the condition also follows fractures, burns, frostbite and punctured wounds, and most of such injuries have been about the polyarticular regions of the hand, the carpus or the foot.

It is interesting to observe that the condition under discussion has been described by different authors under several different names. Sudeck and others have called it "acute atrophy of bone". "Traumatic angiospasm", "traumatic vasospasm", "chronic traumatic œdema", "peripheral acute trophoneurosis", "reflex nervous atrophy", "post-traumatic osteodystrophy" and "post-traumatic dystrophy of limbs" are a few of the names applied, and it is obvious from the diverse nomenclature that different manifestations of the same condition have attracted the attention of different authors.

Pain occupies a prominent place in all descriptions and is usually stated to be constant and aggravated by movement or use of the limb, but not relieved by rest. All authors stress the lack of proportion between the severity of the injury and the degree and persistence of the pain. Several talk of threatened or actual suicide. Some believe there is a relation between an unstable nervous system and the proneness to the disease, but most do not mention it. At least one author believes that causalgia and phantom-limb pain are comparable and related conditions.

One comes to know how much pain results from various injuries. One knows that most limbs with minor injuries are immediately comfortable when immobilized, and that even fractures so treated promptly become more tolerable. When this normal sequence does not ensue, but the pain remains, persistent, unremitting and severe, then the possibility of Sudeck's atrophy should be considered.

The next striking clinical feature is the swelling. This is often described as hard, not pitting œdema. It is usual for a limb which is not swollen on removal of the plaster cast to swell with use for a week or two, especially the the lower limb. In Sudeck's atrophy, however, the affected part is found swollen when the plaster cast is first removed and it remains swollen. It gives a sensation of hardness and the swelling is not circumscribed, but affects the whole ankle, the tarsus and foot, for instance, gradually fading to normal above the malleoli.

This hard swelling cannot be dispelled by massage and kneading, as ordinary œdema can. It persists throughout the disease. It gives external evidence of the pathological changes one presumes in the joint capsules and in the tendons in their sheaths, accounting for the next prominent feature—namely, joint stiffness.

This question of joint stiffness is interesting. I have often been struck by the fact that some patients are more prone to stiffness than others in the same circumstances. Sometimes, on self-righteously removing a plaster cast which unnecessarily immobilizes the fingers, one is downright disappointed that no stiffness is present. This, I think, is more often observed in a completely flaccid, paralysed limb; but it is found also in other cases. And again, sometimes after applying a plaster cast or splint with the satisfying feeling that it cannot be improved upon, one is horrified to see the dread spectre of stiffness appear. I believe that such cases are related to the condition we are discussing. Perhaps they are abortive cases of Sudeck's atrophy. At any rate, severe and intractable stiffness is a constant feature of Sudeck's atrophy. The fingers are nearly fully extended and possess only a few degrees of movement, and that painful; similarly with the wrist, ankle, tarsus and toes. In some cases described, of involvement of a whole limb, the elbow and shoulder are similarly stiff. I suppose, as I mentioned before, that this stiffness is at least partly caused mechanically by the indurated swelling. It is interesting that most of the authors mention prompt relief from the stiffness following their favourite operation.

Vasomotor changes occur always. The skin is dusky red and may be hot or in some cases cold. It is assumed by all that these changes are the result of autonomic nerve disorder, and all successful methods of treating Sudeck's atrophy attack this autonomic dysfunction. It is a tenable hypothesis that all the other features—pain, swelling, stiffness and osteoporosis—are secondary to vasomotor changes in the deeper structures, and that in fact Sudeck's atrophy is basically a disorder of the autonomic nervous system, vasomotor subdivision.

It is the bone decalcification that gives the name to the disease, and I think this is unfortunate, because the bone atrophy is the least arresting of the clinical features. Sudeck first described it in 1900 and Kienbock in the following year elaborated the radiographic findings. Sudeck thought there were two types, acute and chronic, and called attention to the spotty, patchy distribution of the decalcification. It came to be known as "mottled atrophy", and I think again that this name has held back the clinical investigation of the disease. Because the atrophied bone was not mottled, I have heard people deny that a certain case belonged to the category we are dis-

cussing, though the other features were striking. All authors mention the patchy nature of the decalcification, and some illustrate it; but all also describe a widespread, uniform osteoporosis. I believe the mottling is a feature of the early stage, but this may be short. Later it becomes uniform. I do not think it is necessary to see mottled atrophy before diagnosing the condition.

There has been much discussion about the cause of the decalcification. All observers are agreed that it is more rapid in onset and tends to be more extreme in degree than the atrophy of disuse. Moreover, it occurs in spite of use. All also agree that bone decalcification is a result of hyperæmia (following Leriche and Fontaine), and all who mention the anomaly are at a loss to explain the good results of operations on the sympathetic system, which admittedly produce vasodilatation. Turner, however, thinks "it is natural to assume an acid solvent liberated by nerve endings which convey distal irritation, just as acetyl-choline is liberated by motor end organs to activate muscle".

The patchy areas of decalcification enlarge and coalesce until the cortex of the affected bones becomes thin, and in places the outline is difficult to trace in the film. The lamellæ fade into each other and produce an ill-defined, faint, homogeneous shadow. The loss of definition of the cortex produces an appearance suggestive of bone destruction or erosion, such as is typical of tuberculous osteitis. In fact, if the X-ray appearance alone is considered, the distinction from tuberculosis is practically impossible. It appears that Sudeck's atrophy has been repeatedly mistaken for tuberculosis—a natural mistake if one relies on the X-ray appearances alone and ignores the other clinical features. One author illustrates cases in which this apparent erosion is followed by actual bony fusion between adjacent carpal bones. I myself think that this is unlikely if the condition is due to mere decalcification. Be that as it may, I include the observation to emphasize the degree of demineralization which may occur.

With regard to recalcification of the bones after successful treatment or spontaneous recovery, those authors who discuss it at all are agreed that complete return to normal bone density does not occur, even years later. There is some recalcification, but it is apparently never complete.

Ætiology.

This, then, is a description of Sudeck's atrophy. How is it brought about? There is unanimity of opinion that it is the result of a sympathetic reflex; but there is no agreement about the underlying nerve paths, nor is there an understanding of the steps whereby a sympathetic disturbance results in the clinical features I have described. It is fairly widely accepted that hyperæmia leads to bone decalcification and as a corollary that decalcification is due to hyperæmia—by no means a logical conclusion. But difficulties arise in correlating the theory with the observed facts. It is true that the affected part is flushed and warm in some cases—perhaps in the early stages in all cases. But in later stages the limb is often described as cold. Moreover, if hyperæmia is the cause, why does sympathectomy, which is known to result in peripheral vasodilatation, often cure the symptoms?

Finally, though vasodilatation may be a satisfying explanation of the swelling, cyanosis, induration, joint stiffness and bone atrophy, it is not in itself an adequate explanation of the pain. It is widely held that pain is not transmitted by the autonomic system; yet descriptions of successful treatment by sympathectomy constantly emphasize the prompt relief of pain. There may be an explanation of relief of pain by periarterial sympathectomy if pain is conducted by the sympathetic system; but the same explanation does not cover the relief which also apparently follows ganglionectomy, ramisection or the blocking of the sympathetic chain by local anæsthesia.

These observations on the pain factor in Sudeck's atrophy are a measure of the uncertainty of its explanation shown in the literature. Perhaps the most satisfactory working hypothesis is that of Leriche (quoted by Homans), that "whatever pain is, it is certainly influenced by the sympathetic system and can sometimes be abolished by cutting off sympathetic impulses from the affected part".

Turner maintains that cases following injury about the wrist (he quotes several following bites from cats, and Colles's fracture) are due to direct injury to the terminal part of the dorsal interoseous nerve. This nerve forms a gangliform enlargement under the extensor tendons on the dorsum of the radius, before distributing a widespread ramification of fine fibres to the carpal and metacarpal bones and joints. And he elaborates this later, in another paper describing delayed union. He points out that decalcification of the fractured ends always occurs in the early stages of recovery from any fracture. This, in his opinion, is reflexly brought about by pain impulses from the fracture and is purposeful in nature, it being Nature's intention to mobilize calcium locally which will shortly be used to repair the fracture. If the local pain is not abolished, either because of inadequate immobilization or in some unexplained cases in spite of it, the reflex continues and the decalcification becomes chronic. Irritation of peripheral nerves by skeletal traction is in his view competent to perpetuate the decalcification.

Treatment.

Conservative therapy is ineffective. In fact, the failure of conservative treatment is a factor in the diagnosis. If a patient recovers under normal treatment by immobilization and rest he is not suffering from Sudeck's atrophy. Nobody recommends treatment by manipulation; most, either directly or by implication, condemn it.

There is agreement about interrupting either the afferent or the efferent nervous connexions with the injured part, but a diversity of opinion exists in the methods of doing it. These nervous connexions may be interrupted at one of several levels. Sometimes there is a local source of irritation in the neighbourhood of the original trauma. An example is a vein, thrombosed and adherent; another is a matting together by adhesions of a peripheral nerve and adjacent structures. On occasion, excision or dissection of such a local lesion has been followed by prompt relief of the symptoms. This is explained by the theory that the local irritation causes a constant stream of afferent impulses, which initiate the vicious circle.

Success has also followed blocking of the local sensory nerves by the injection of "Novocain". This may result in immediate relief from pain and early reduction in joint stiffness; but it seems necessary to repeat the performance several times. Turner tries to identify one or more tender spots, which he believes overlie a sensitive peripheral nerve branch, and he directs his "Novocain" or alcohol to these spots.

Stripping of the adventitial coat of the main artery of the limb has been practised and recommended by the followers of Leriche. This practice has its successes and is explained as an interruption of sympathetic fibres subserving vasomotor control. More recently, however, neurologists are coming to believe that afferent sensory sympathetic fibres do exist and that their course is (in part) in the walls of blood vessels, and they point to the success in treating other painful conditions—for instance, dysmenorrhœa and tuberculosis of the bladder—by arterial stripping.

Another line of attack on the presumed vasomotor reflex is by ramisection, another by "Novocain" block of the appropriate ganglia of the sympathetic chain, and yet another by section of the chain or extirpation of the ganglia. For the upper limb it seems that better results are achieved by section of the chain below the first thoracic ganglion than by removal of the stellate ganglion, and for the lower limb by excision of the second and third lumbar ganglia. In any event, it seems desirable first to test the probable effectiveness of these major operations by "Novocain" blocking of the sympathetic chain.

Results.

I have given you a summary of current methods of treatment. Apparently any of them is at times dramatically successful, and the various authors have their individual

preferences. I am unable, as I have said, to give any personal experiences; but in order to illustrate the sort of result that is claimed I shall describe several typical case histories.

The first appears in a paper by Fontaine and Hermann. It relates the story of a man whose hand had been trodden on by a cow four months earlier and who presented all the clinical features I have enumerated. The stellate and intermediate ganglia were removed at operation and several hours later "the œdema had completely disappeared, the hand was very warm, and the skin was of the normal pink colour. The movements of the fingers were free and the motion was not painful." During the next three days the cyanosis returned and the finger movements again became restricted. Consequently, four days after the ganglionectomy, a second operation was performed, this time a periarterial sympathectomy of the brachial artery. This was followed by return of the movements of the fingers and by moderate hyperæmia of the entire hand and arm. Unfortunately the patient could not be followed up, because he developed an acute alcoholic psychosis and died in *delirium tremens* three weeks later. This is not a very complete case; but I put it in because the prompt but evanescent relief of symptoms is typical of many others.

The next patient is described by the same authors. There is not the usual history of external trauma, but I think the case belongs to the disease we are discussing and it is worth repeating because of the description of the radiographic changes and because the result of treatment was lasting. The patient, a man, felt a sudden pain in his wrist on lifting. Six months later marked œdema of the entire hand was present with almost complete fixation of the wrist joint and pronounced tenderness over the carpal bones. The X-ray film revealed irregular rarefaction of all the carpal bones, with complete absence of the outline of some of them—a homogeneous shadow with no detail. Not unnaturally the diagnosis of tuberculosis was made and the wrist was immobilized in plaster. However, the pain and swelling became much worse, contrary to expectation, and after some further investigation the diagnosis was revised. A periarterial sympathectomy of the brachial artery was performed and the pain disappeared soon after. Two weeks after operation the wrist movements were free and painless and the œdema had gone. Two months later the wrist was normal and the X-ray examination at this time revealed an almost normal appearance of the carpus; the outline and density of the bones had returned. In two months more the patient reported that he was working regularly without the slightest pain, and three years later he was still well.

The next illustrative case is reported by Homans, of Boston. The patient sustained sepsis of her little finger following puncture by a splinter, and the finger was amputated. A small sinus persisted, and pain and hyperæsthesia of the ulnar half of the hand became intolerable. Cyanosis was also present, but œdema, joint stiffness and bone atrophy are not mentioned. A sympathetic "Novocain" block (presumably of the stellate ganglion region) was performed, followed by loss of the cyanosis and paræsthesia and diminution of the pain. Two days later the "Novocain" block was repeated, with reinforcement of the relief. These local anæsthetic blocks were considered diagnostic in function, so next the ulnar artery was stripped. After this the improvement was dramatic. Pain was abolished and the skin resumed its normal appearance. Six months later the patient felt fit to work, though the tiny sinus still persisted.

These are three fairly typical cases, with their response to treatment. While suggestive, such small series are not convincing; but Hermann and Caldwell report 84 cases occurring in four years; 34 of them are designated "acute painful variety". All the patients were treated by periarterial sympathectomy and were relieved of their pain within twenty-four hours and of their œdema and stiffness in a few days. They were all able to resume work on the average in three months. Four of the series were treated by irradiation therapy, with relief from pain but not from the functional disability. The remaining 46 were first examined when the condition was in the chronic or subacute stage, and it is the authors' belief that such patients are not benefited by sympathectomy. They were therefore treated only by physiotherapy and "the unfavourable able sequelæ were about as frequent as when the process was left untreated".

Conclusion.

This is the meagre result of my admittedly inadequate studies. It will be useful only if it evokes a profitable discussion today and perhaps arouses an interest which will be productive of experiment and research. I am sure that many cases of Sudeck's atrophy occur in our respective clinics, and it behoves members of this association to give a lead in the study of this and similar orthopædic problems.

PERTHES'S DISEASE AND ITS OCCURRENCE AS A FAMILIAL CONDITION.[1]

By ELIZABETH MCCOMAS,
Melbourne.

THE pathological condition of the hip joint usually known as Perthes's or Legg's disease was first described by Legg in 1909, and in 1910 cases were reported simultaneously by Perthes and by Calve. Since that time many surgeons have studied the condition, and while unanimity has been reached in regard to symptoms, X-ray findings and the course of the disease, the ætiology is still unknown. In the early days there were two main schools of thought, those favouring an infective process and those favouring trauma as the predisposing factor. With regard to the infective theory, as the condition is not fatal, pathological examinations could rarely be carried out, while the similarity in the course and length of the disease in different cases regardless of the type of treatment would cast doubt on this theory. The protagonists of the trauma theory point out that a history of injury is frequently obtained; but in most cases the injury is assumed to be a cause, or its possibility is suggested to the patient or parent by the questioning, and it is usually of much too recent occurrence to explain the X-ray findings. This theory also fails to explain the large number of bilateral cases.

In 1936, Cavanagh, Shelton and Sutherland reported six cases in which they had found thyreoid deficiency, and they held that this was the deciding factor and that in all these cases healing occurred when thyreoid therapy was given. However, as the period of therapy corresponded closely with the time at which healing might normally be expected, and as it was also combined with the abolition of weight-bearing, it is thought that the thyreoid extract cannot be accepted as the cause of the regeneration.

In 1943 Bruce Gill reported a study of 20 cases of this disease in which the most careful examinations failed to reveal any evidence of hypothyreoidism. Bruce Gill himself favours the theory that the condition is caused by interference with circulation to the epiphysis and the metaphyseal plate.

I believe that most orthopædic surgeons will agree that the ætiology of Perthes's disease is still shrouded in mystery. With regard to symptoms, the course of the disease and the X-ray findings, we are on much more solid ground. The condition consists of softening of the capital epiphysis of the femur, occurring in children aged between three and eleven years, 85% to 90% of those affected being boys. The softened head becomes deformed by weight-bearing, and the X-ray findings are usually pronounced in comparison with the clinical findings. The condition passes through certain stages and appears to be self-limiting. Bruce Gill, who has made numerous studies of early cases, described the following stages:

1. Early necrosis of the metaphysis of the neck of the femur and the appearance of areas of decalcification,

[1] Read at a meeting of the Australian Orthopædic Association, Brisbane, June, 1946.

usually conical in shape, with the base of the cone to the metaphyseal plate, suggesting aseptic necrosis due to interference with or blocking of the blood supply.

2. Degenerative changes in the head concomitant or subsequent to the changes in the neck. There are irregular areas of decalcification with isolated areas of increased density, the condition as a whole being spoken of as "fragmentation".

3. Regeneration, which occurs much more rapidly than the degeneration and starts first in the metaphysis.

Weight-bearing during the degenerative stage, which lasts roughly for one to one and a half years, will lead to flattening of the head, so that with regeneration a deformed head is left which does not fit accurately into the acetabulum, and this will lead to some limitation of movement at the time and to the development of osteo-arthritis in early adult life. While there seems to be little that we can do to shorten the actual course of the disease, the earlier the diagnosis is made and the sooner the child is taken off his feet, the less deformity may be expected.

The symptoms are usually mild compared with the changes shown in the X-ray film, and are frequently intermittent, being rapidly relieved with rest. The child complains of pain in the hip or, more frequently, referred to the knee, and may have a slight limp. On examination some limitation of movement will be found, usually most pronounced in rotation and abduction, flexion and extension being relatively free. All these symptoms may diminish or even temporarily disappear with rest.

Report of Four Cases.

During the last twelve months I have been interested in finding a series of four cases occurring in one family, and as I can find only a few reported cases in which the condition was familial, I believe that this series may be of interest to members. I shall deal with the cases in the order in which they came to my notice.

Case I.—Mrs. C.O., now aged twenty-seven years, was first examined in 1943, complaining of aching pain in the left groin since a fall from a bicycle six months before. The patient said that she had attended hospital at the age of eleven years for a pain in the left hip severe enough to wake her up at night. She was given a walking caliper then, which she wore for one year; from that time she had had no trouble until the fall. X-ray examination on September 22, 1943, revealed *coxa vara* due to Perthes's disease of the left hip, a slight degree of *coxa vara* being also present in the right hip. The patient was given physiotherapy to the left hip, which relieved most of her pain, and she had not been seen for over two years until she reported at my request three weeks ago. She then stated that the left hip troubled her at times, but that the pain was relieved by heat and massage, and that she had recently had some pain also in the right hip. X-ray examination revealed no essential change since the last examination.

Case II.—Robert B., aged four and a half years, is a nephew of Mrs. C.O. (Case I). On April 8, 1945, the mother brought this child to the hospital with his brother, aged seven years, and asked if they might have their hips radiologically examined. She said that an uncle had recently been examined at another hospital and had been told that he had pronounced bilateral Perthes's disease, for which little could be done. Neither of the children complained of any symptoms, but X-ray films were taken. While the older child was perfectly normal, the films of the younger child revealed flattening and fragmentation of the upper epiphysis of the left femur—Perthes's disease. On careful examination, slight restriction of inward rotation and abduction appeared to be present.

Case III.—John B., aged twelve years, is a brother of Mrs. C.O. (Case I) and an uncle of R.B. (Case II). He first attended hospital in October, 1942, and was treated in a medical clinic. He was complaining of pain in the left groin, of sweats at night and of attacks of vomiting. He is reported to have had pronounced lordosis and a limp, and to have rolled to the left side in walking. There was no limitation of movement in the hips, deep inguinal glands were enlarged, no X-ray film was taken and he was treated with plastines. The Mantoux test failed to produce a reaction. On January 4, 1943, he reported with diarrhœa, vomiting, abdominal pain and slight tenderness in the right iliac fossa. On January 14, 1943, a pyelogram revealed no abnormality. On January 22, 1945, he reported, complaining of pain in the right hip, sometimes in the knee and even in the ankle. He said that he had had no pain in the left hip lately. He was transferred to a surgical clinic, where he was found to have a fairly good range of movement in both hips, but with slight limitation in abduction and inward rotation. An X-ray film taken on April 6, 1945, revealed gross changes in the heads of both femora suggestive of bilateral Perthes's disease.

Case IV.—Ross B., aged twenty-eight years, is the father of R.B. (Case II) and brother of Mrs. C.O. (Case I) and J.B. (Case III). He says that he has suffered from "rheumatics" for years, and from pain in the back and in both hips, that in the back having become much worse lately. He has never been able to play games satisfactorily and has had a peculiar gait for some years; but he had apparently paid very little attention to the condition until his son was sent to hospital, when he was persuaded to seek attention at an adult hospital. He reported on September 24, 1945, when it was found that he had fairly pronounced limitation of abduction and rotation in both hips, and an X-ray examination revealed gross *coxa vara* suggesting old bilateral Perthes's disease.

This series of cases is of interest, not only in that it shows a familial tendency, but because three distinct stages are represented. R.B. (Case II) is in as early a stage as we can ever hope to see, as he had no clinical symptoms when the diagnosis was made. At present the left femur only is involved; but examination of the right femur reveals a certain degree of *coxa vara* and it seems possible that a familial tendency to a decreased angle of the neck of the femur may have some importance in these particular cases. This child has been recumbent for a year now, and I believe that it will be most instructive to watch the right hip for any change.

J.B. (Case III) is still in the stage of fragmentation, though pronounced flattening of the heads of the femora has already occurred.

Mrs. C.O. (Case I) and Ross B. (Case IV) show the final picture. Case I, however, is of particular interest, in that the original diagnosis was of unilateral Perthes's disease, while the recent X-ray examination reveals some *coxa vara* on the other side also, bringing this case in line with Case II.

Summary.

1. I have presented this series of cases to show that in rare cases Perthes's disease may be familial.

2. I would suggest that in these cases a familial tendency to mild *coxa vara* may have played some part in the causation.

Acknowledgements.

My thanks are due to Dr. Eric Price and to Dr. Norman Harry for permission to present their cases in the series.

HALLUX VALGUS AND HALLUX RIGIDUS.[1]

By D. J. Glissan,
Sydney.

A circumstance which is partly accidental has resulted in my bracketing for discussion the subjects of *hallux valgus* and *hallux rigidus*.

Whilst this is a customary and almost traditional course, it is one which I heartily condemn, since to my mind it leads to a great deal of confused thinking and to an incorrect approach to each subject. The two conditions have nothing in common except a concern with a disability affecting the first metatarso-phalangeal joint.

The ætiology, symptomatology and, in my view, the treatment of the respective conditions differ so radically as to entitle each to separate and select consideration.

[1] Read at a meeting of the Australian Orthopædic Association, Brisbane, June, 1946.

Hallux Valgus.

Hallux valgus is essentially a descriptive term used to indicate a certain deformity affecting the great toe. I could wish for a more comprehensive label for a condition which rests on a much broader pathology and is fraught with much wider implications than is implied in a title having regard to a deformity at one joint only of the foot. But as Charles Dickens said of the simile of the door-nail: "The wisdom of our ancestors is in the simile and my unhallowed hands shall not touch it."

The term inevitably concedes first place to shape or form at the expense of the consideration for function which should be the first concern of the orthopædic surgeon.

Lateral deviation of the hallux is merely one facet of a many-sided disability, and when we speak of *hallux valgus* we should bear this in mind.

How frequently do we find the deformity well established whilst a careful survey of the symptoms of which the patient complains shows that they arise not from the deformity, but out of one or more of the defects of which the great toe deformity is merely a concomitant.

Not a few people have sought surgical advice, complaining of a painful foot, and have submitted to operative correction of an obvious valgus deformity of the great toe, only to find that their symptoms have remained completely unrelieved. There has been good reason for this, since the symptoms have been based upon some other facet of the foot disability, such as the associated flat-foot or contracture of the toes.

We must bear in mind, and it is our duty as orthopædic surgeons to teach, that the condition known as *hallux valgus* is not a single and separate entity confined to the first metatarso-phalangeal joint. It is part of a general defection in the function and structure of the foot in which all the toes are ultimately involved. The symptoms to which it gives rise may or may not be based wholly or in part upon irritation about the prominent metatarsal head. They may arise only in relation to the associated defects in the remaining toes, or in conjunction with the defects in function of the foot as a weight-bearing and weight-propelling organ. Pain about the detormed joint depends upon the operation of two factors: (*a*) Friction. If this is absent there are no subjective symptoms. (*b*) Degenerative age changes which give rise to intrinsic joint pain.

The deformity may be unilateral or affect each foot, whilst any symptoms related directly to the deformity may also be confined to one side only.

The defect at the first metatarso-phalangeal joint is in the large majority of instances not a primary one, but, as Truslow reminded us as far back as 1926, it is secondary to a congenital anomaly at the first tarso-metatarsal joint, leading to *metatarsus primus varus*.

It is not surprising, therefore, that a careful survey of cases occurring in adults will reveal a history of deformity extending back to childhood, and that we find furthermore a number of children complaining either of the deformity or of symptoms associated with it.

It will be helpful, therefore, to consider the condition as it affects different age groups. The deformity in early childhood is encountered usually rouné about ten or twelve years of age and in the following circumstances: the parents complain of the deformity of the great toes or the child complains of pain in the feet. I have found that the last-named is the more usual experience.

Examination discloses concise deviation of the great toe based upon a primary varus deformity of the first metatarsal bone. Varying degrees of flat-foot, usually of the physiological type, are found, and even at this early age evidence of the inevitable contracture at the metatarso-phalangeal joints of the four outer toes will usually be detected if it is sought for carefully.

Treatment.

If the deformities at the relevant joints are not more than slight, if there is no obvious sign of the effect of friction about the metatarsal heads, and particularly if the symptoms complained of by the child are related to the associated foot fault, conservative measures will probably suffice to give relief.

The fault in relation to weight-bearing and weight-propulsion must be corrected and in the case of a young child it is frequently difficult to train it in the correct control of the feet.

Any deforming influence in shoes and socks must be rectified immediately, even to the extent of digitating the socks. The heels must be crooked medially one-eighth of an inch.

A light *hallux valgus* splint is worn at night for at least six months and a band of adhesive plaster is applied about the forefoot whilst the first metatarsal is held corrected; the adhesive plaster is worn continually for a similar period. Particular attention should be paid to the remaining toes. The parents and child must be shown how to bring each fully stretched toe into full flexion at the metatarso-phalangeal joint passively as well as by active muscle contraction. The metatarsal heads must be maintained steady whilst this movement is carried out. Metatarsal bars, provided they are accurately placed, are valuable aids to this end.

When the deformities at tarso-metatarsal and metatarso-phalangeal joints are marked, when there is frank evidence of friction over the metatarsal heads, and particularly when the symptoms are related to the deformity and in those cases in which conservative measures fail, operation must be carried out.

It is essential, however, to defer operation until the surgeon is satisfied that any fault in foot control has been corrected.

In the age group fifteen to thirty-five years the deformity should be corrected by operation after any error of function in relation to weight-bearing and weight-propulsion has been rectified. This usually requires a period of three months.

In the age group thirty-five to fifty years one has to be more discriminative. Here the influence of such factors as contracture of the toes and confirmed errors in foot function is more marked and a very careful survey of the symptoms of which the patient complains must be made if he is to be relieved of his trouble.

In regard to the actual deformity, operation is usually necessary and advisable, but the type of operation has to be carefully chosen. If the joint surfaces are normal and free of any evidence of wear and tear, and if from a general survey of the patient and his activities it is considered that there is a reasonable expectation that the joint's integrity will be maintained, routine operation is carried out.

If, however, any of these matters is in doubt and it seems likely that a satisfactory range of painless movement cannot be looked for following the usual operation, the joint should be fused after correction of the metatarsal deviation.

The greatest care should be taken in either case to correct any toe contractures. Amongst cases occurring in this age group there begin to appear examples of extreme toe contracture in conjunction with gross deviation of the great toe. No amount of correction of the *hallux valgus* element will relieve these patients, whose symptoms almost invariably include some which are related to the deformities of the outer toes. These provide a very severe test of a surgeon's capabilities and judgement, since a proportion of these patients need routine operation to relieve both sets of deformity. In some cases simple tenotomy with excision of the head of the second metatarsal will give relief of symptoms arising from toe contractures.

After fifty years of age the routine operation has very little application, and arthrodesis after correction of the metatarsal displacement takes its place. The functional needs of the foot and joint are less pressing in this group and the requirement is for a comfortable, painless foot freed of the risk of acute or suppurative bursitis. In some cases, therefore, removed of the exostosis alone with careful smoothing of the cut surface will suffice to relieve the more urgent symptoms related to the deformity.

In the older patients relief can be obtained by adapting the footgear to the deformities of the forefoot. Balloon

patches will house comfortably and safeguard from friction the prominent metatarsal heads and the convexities of contracted toes. These must be fitted immediately to new shoes so that the foot is not allowed to shape and mould to its irregularities of contour the leather of new footwear. Correctly placed metatarsal bars and constant attention to callosities of the foresole are very necessary adjuncts to treatment.

Operation for Hallux Valgus.

Operation is based wholly upon the pathology and fundamentally upon the procedure described and elaborated by Truslow and published in 1926.

A small flat sandbag is placed beneath the operation sheet opposite the lower third of the leg. An Esmarck's tourniquet is applied and held on the fleshy part of the calf. A shallow, curved incision commences on the medial side of the dorsum of the great toe, distal to the line of the interphalangeal joint when it is desired to fuse this, otherwise a little beyond the level of the metatarso-phalangeal joint. Fusion of the first-named articulation is always carried out when there is any lateral deviation of the distal phalanx after a sufficient adjustment of the bone surfaces has been made to correct the deformity. It is also performed when there is so much shortening of *longus pollicis* as to render alignment at the metatarso-phalangeal joint difficult and to make it necessary to lengthen the tendon.

The incision curves gently across the toe, follows the line of the first intermetatarsal space and opposite the base of the metatarsal curves inwards once more to end on the inner side of the foot just opposite the first cuneiform bone. Great care must be taken to avoid cutting the tendon of *extensor longus hallucis* in the first part of the incision.

The skin and superficial fascia are lifted medially from the sheath of the *extensor longus hallucis* and the inner, dorsal and medial aspects of the joint are cleared. An incision is made down to the bone, commencing on the neck of the metatarsal, curving dorsally over the region of the exostosis and ending on the base of the phalanx. The periosteum is lifted and with a sharp, stiff knife the exostosis is bared completely. It is then cut off cleanly with a thin-bladed osteotome. The edges are smoothed and bevelled slightly, and with a small hammer the cut surface is gently beaten down and flattened. No trace of irregularity must be left on the cut surface.

In cases in which there is no exostosis and no indication to fuse the interphalangeal joint the incision commences at a point between the first and second metatarsal heads. In either case the incision is now deepened to expose the lateral aspect of the capsule of the metatarso-phalangeal joint. This is incised longitudinally and along its length and the upper and lower split halves of the capsule, detached from the metatarsal head and base of the phalanx by careful dissection with a sharp-bladed knife. The digit can then be brought readily and without force into line with the long axis of the metatarsal.

The incision is developed proximally and the flap turned up to uncover the proximal end of the metatarsal. The tissues are divided down to the bone immediately to the outer side of and exactly parallel to the tendon of *extensor longus hallucis*, care having been taken to avoid the joint capsule. The cut commences just distal to this and goes forward. The two extensor tendons are hooked respectively medially and laterally. The periosteum is lifted off the bone on its dorsum and sides. A thin-bladed and sharp osteotome, half an inch wide, is driven into the base just distal to the joint line and at right angles to the long axis of the bone. This cut outlines one side of a wedge, the apex of which is so placed as to lie just lateral to the medial border of the shaft. The second cut is made, completing a wedge of sufficient width to permit the metatarsal shaft to lie parallel to its fellows when it is removed.

The wedge is removed carefully and piecemeal. The shaft and base are now connected by a thin bridge of bone formed by the medial cortex of the bone. The osteotome is now entered at the apex of the wedged gap and driven in such a way as to detach the distal fragment or shaft, leaving attached to its proximal end and on its medial side a spike of bone. The metatarsal shaft can now be swung in readily and the gap closed; the spike abutting against the base of the bone preventing the otherwise inevitable tendency for the whole shaft to travel laterally.

The periosteum is now secured by a few sutures to cover the bared area of the bone. In the few cases in which it is thought essential to lengthen the tendon of *extensor longus hallucis*, this is now done by a long oblique tenotomy and the tendon ends are secured. The divided capsule covering the medial side of the joint is sutured in position. The tendons of *extensor longus digitorum* are divided subcutaneously and the skin incision is closed.

A moulded aluminium splint, cut beforehand to fit the patient and boiled with the instruments, is covered with a prepared dressing pad and bound to the forefoot, whilst the latter is firmly compressed from side to side to maintain the metatarsal correction. The great toe is then bound to the splint, care being taken not to compress the toenail.

A light plaster slab is moulded to the bandage-covered sole and the under-surface of the toes, whilst these are maintained extended at the interphalangeal and flexed at the metatarso-phalangeal joints. A felt pad is placed over the dorsum of the toes and bound to the plaster slab to retain the position just described. The tourniquet is removed. The forefeet are examined with X-rays in forty-eight hours, and if the position is not satisfactory the metatarsal shaft is readjusted after a further three to four days, usually under "Pentothal". Then the feet are left completely undisturbed for one month, the patient practising meanwhile movements at the ankle and mid-tarsal joints.

Thereafter weight-bearing is commenced gradually, the patient practising active movements at the metatarso-phalangeal joints. No forced movement is permitted in relation to the first joint. Care is taken to control swelling by guarding against overlong periods of dependency at the outset and by a *crêpe* elastic bandage worn from the forefoot to below the knee in certain cases.

HALLUX RIGIDUS.

Painful restriction of motion at the first metatarso-phalangeal joint is encountered at all ages from early childhood to late in life. In my experience the affection is usually unilateral.

It arises as the result of a uniform type of pathological change in the joint, a change which follows the pattern of osteoarthritis. Two varieties may be differentiated: a precocious form affecting children and the ordinary type encountered in the middle-aged joint.

It is difficult to explain the occurrence in children of a condition which is based essentially on deterioration of the blood supply, and it is possible that these forms of the disease may be analogous in effect to such epiphyseal changes as occur in Perthes's disease, Köhler's disease and Scheuermann's disease and kindred conditions.

Trauma plays an indisputable part in the genesis of the disease, and the stubbed or crushed great toe joint must at all times be treated with the greatest respect. These are the types of injury which almost invariably precede the onset of the pathological changes.

The development of marginal osteophytes is a feature of the condition. At times these reach a large size and cause painful projections, particularly upon the dorsum of the metatarsal head.

The most constant site, however, is on the outer dorsum of the joint and it is very unusual not to find a concise bony projection here and a constant tender spot. These in effect form an early diagnostic corner stone for the condition. Pain and impaired range, particularly of dorsi-flexion, are other early signs.

The limitation of movement is not due to the presence of marginal osteophytes, but to a change in contour of the bony components of the joint. The head of the metatarsal becomes squared off so that the normal gliding

excursion of the base of the phalanx is no longer possible upon it.

In severe cases the limitation of dorsiflexion is translated slowly to a concise flexion deformity, a very crippling feature.

Treatment.

As already indicated, every instance of stubbed or crushed joint should be regarded as a potential case of *hallux rigidus*. The joint should be rested completely for six weeks, the great toe being maintained in full dorsiflexion by a moulded aluminium splint and the whole guarded by a plaster walking shoe.

In established cases operation should be carried out. In the case of children one has to wait until after the tenth year.

Operation.

A chance observation made at the beginning of 1932 led me to what I regard as the correct surgical solution of the problem of *hallux rigidus*.

During the routine examination of a patient for an injury to her ankle, I found that her first metatarso-phalangeal joint was rigidly fused as the result of an old infection. On inquiry the patient told me that she suffered no inconvenience of any sort by reason of the rigidity of her toes and that she was able to engage in all forms of activity and sport completely unhampered by what I would have been inclined to regard as a concise handicap. Careful examination revealed the clue to her function, since by a fortuitous circumstance fusion had occurred with the great toe in moderate dorsiflexion at the former joint.

On July 8 of the same year I fused the greatly disorganized metatarso-phalangeal joint of a female patient, thirty-two years of age. She had suffered by virtue of *hallux rigidus* associated with flexion deformity since thirteen years of age. The desired angle of dorsiflexion was carefully discussed with the patient beforehand, and it was decided that she should not seek to wear following operation a heel higher than one and a quarter inches. An aluminium splint was moulded beneath the sound foot and toe whilst the weight was borne upon the heel resting on wooden chocks one and a half inches high. A simple fusion operation was carried out and the splint thus prepared and moulded was applied and secured to the foot and toe by narrow gauze strips soaked in compound tincture of benzoin. This was left *in situ* undisturbed for two months. The part was then examined, and I found it to be fusing firmly, and the patient was then allowed to bear weight upon the heel, but not upon the forefoot for a further month. The final result from the point of view of function can only be described as extremely gratifying, and the plan of attack thus justified has been continued ever since when I have had to deal with this disability.

I suffered a few disappointments in my subsequent early cases in the delayed fusion in certain joints, the articular surfaces of which were extremely hard and sclerosed. There was a tendency in these cases for the selected dorsiflexion angle to be diminished during the healing process. I now in practically all cases bridge the joint area with a small inlay graft cut from the metatarsal. The results have justified the slight extra technical addition.

The same operation is carried out in certain cases of *hallux valgus* when the condition of the joint and the age of the patient suggest to me that the routine operation in practice for *hallux valgus* is unsuitable. The technique is more difficult here since in most of these cases the wedge osteotomy at the metatarsal base has to be carried out. My procedure is to carry out the steps of the arthrodesis first, the great toe being aligned on the metatarsal with the latter in the varus position. The osteotomy is then performed and the metatarsal realigned. The great toe is fixed at the correct angle of dorsiflexion, the graft inserted and the splint applied. In such cases in the presence of marked deformity of the great toe it is not possible to mould the splint beforehand directly upon the foot and it requires a little ingenuity to mould the splint by the use of the wooden chocks alone.

After-treatment consists of immobilization for three months. In all cases the integrity of the aluminium splint is guarded by the envelopment of the parts in a light plaster.

AMPUTATIONS.[1]

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The matter of amputations has always been one which has been little understood by surgeons and dealt with in a most inadequate and usually grossly inefficient manner in text-books. If a surgeon were to perform an amputation according to the directions in most books on operative surgery, the resulting stump would be a shocking thing. Truly enough, we are not in peace time called upon to perform a great number of hip disarticulations; but on the other hand partial amputations of the fingers are often required and are worthy of the greatest care. How often does one see a man who has undergone an amputation of the finger who dreads returning to work because of tenderness? This should not be, and exactly the same principles apply here as in major amputations. It is most important to obtain healing with the very minimum of scarring and deformity. The other great point is that a final amputation should be performed with a firm idea in your mind of what sort of prosthesis, if any, shall be worn.

General Considerations.

In considering the question of amputations generally, it is stressed that the decision to amputate a limb or portion of a limb should be made only after very careful consideration, and if circumstances permit, after consultation with at least one other surgeon. In spite of progress that has been made or may be made in design and construction of artificial limbs, it must always be remembered that they are but poor substitutes for a natural limb. This is particularly so in the case of the arm and hand, of which the functions served by sensation are of such vital importance. Langdale-Kelham and Perkins[(1)] set out in broad outline the indications for amputations under the following heads: (i) severe trauma, especially when the main blood vessels and nerves have been destroyed; (ii) complications after severe trauma—gas gangrene, vascular thrombosis, uncontrollable secondary hæmorrhage; (iii) prolonged suppuration endangering life; (iv) malignant neoplasm; (v) recurrent disability—ulcers *et cetera*—which prevent the earning of a living; (vi) useless leg—irrecoverable nerve lesions with tropical ulcers and foot deformities *et cetera*; (vii) *thrombo-angiitis obliterans*; (viii) extreme deformity.

Division of the main blood-vessels is not necessarily an indication for amputation, because in a proportion of cases surgical repair of the vessels, though as a rule not permanently successful, may provide sufficient blood to the limb until a collateral circulation is established. In any case, the decision to amputate should be delayed until it is obvious that the limb or part of it is not viable. In cases of gross mutilation, as in crushing injuries and many war wounds, it is usually necessary to amputate the limb at once.

Type of Stump in Leg Amputations.

There are two kinds of stump—those in which the weight is borne directly on the end of the stump, and those in which the weight is borne higher up the limb. Experience has proved that end-bearing is usually successful only on the expanded extremities of the long bones. There are certain advantages in this form of stump, particularly a sense of walking on the end of the limb. This enables the patient to learn to walk more quickly, and engenders a feeling that the gait is more natural than that associated with other types of stump. It is emphasized, however, that the advantages of end-bearing are not such as to warrant operation to provide this form of stump except when the conditions are entirely suitable. It should also be remembered that in women particularly the ultimate cosmetic effect will to some extent influence the choice of amputation site.

[1] Read at a meeting of the Australian Orthopædic Association, Brisbane, June, 1946.

TECHNIQUE OF AMPUTATION.

When possible, a tourniquet is used. Except on end-bearing stumps, a transverse scar is aimed at, either terminal or posterior; semicircular flaps, either equal or with a longer anterior flap, are cut. The length of the flaps should not be guessed, but measured as carefully as possible. Their total length should be approximately equal to the diameter of the limb at the site of amputation *plus* half an inch in larger diameters—for example, the thigh and the calf. Care is taken to preserve sufficient fascia to enable it to be sutured over the end of the bone. Except on the anterior surface of the tibia (in amputations below the knee), where it is preserved as part of the fascial sheet, the periosteum is cut with the bone. Muscles are cut transversely at the same level as the bone transection. Nerves, including the larger cutaneous nerves, are identified, pulled down gently, cut cleanly and allowed to retract, without further interference. Hæmostasis is secured as much as possible; but because this is rarely complete drainage of the stump is advised.

Post-Operative Care.

Dressings are carefully applied and fixed by strapping. Usually some form of immobilization is applied and the limb is kept elevated, with the patient in the recumbent position, until the sutures are removed. Drainage is usually discontinued on the first or second day after operation. The wound is inspected at regular intervals, and if a hæmatoma forms it should be aspirated. Bandaging of the stump should be firm—this helps to prevent the formation of a hæmatoma.

Field or Emergency Amputations.

In all primary amputations, such as field or emergency amputations, the wound should be left open. The method of performing the primary amputation by the "circular" method at the lowest possible level is sometimes wasteful of skin. The great importance of adequate skin in fashioning the final stump is such that no viable skin which is likely to prove useful should be sacrificed at the primary amputation. Skin traction should be applied at the earliest possible moment, and maintained, particularly along the line of evacuation to base hospitals, for it is the universal experience that it is mainly during this period that traction is neglected. Fixed traction in a Thomas splint, with stockinette and skin glue, is an efficient and simple method of applying and maintaining traction to an amputation stump.

Amputations for Chronic Sepsis.

In the amputation of a limb for chronic sepsis, the wound can be closed only if there is sufficient margin of safety between the site of the proposed amputation and the site of the sepsis. If this is not sufficient, amputation at a lower level should be performed, the wound being left open.

Preparation of Open Stump for Reamputation.

The condition of the wound is the primary consideration. (i) In a small proportion of cases, in which the skin flaps happen to conform to normal requirements, early secondary closure of the wound can be performed, and this may sometimes be done as early as the second week. (ii) It does not appear necessary to wait until the wound is completely healed for either secondary plastic closure or reamputation at a higher level. Most surgeons rely on the macroscopic appearance of the wound, and on the general condition of the patient, and consider bacteriological cultures made from the wound of academic interest only.

In general, the local criteria required before secondary procedures are instituted are the following: (*a*) firm, pink granulations covering the surface of the wound, including the bone end; (*b*) absence of sloughs; (*c*) minimal discharge; (*d*) absence of œdema; (*e*) favourable X-ray appearance—that is, no sequestra or bone infection; (*f*) healthy in-growing skin margin. Methods used to obtain these desiderata vary considerably, rest in bed and elevation of the limb being universal. Amongst others commonly in use are the following: (*a*) whirlpool baths in saline solution; (*b*) saline packs; (*c*) cod-liver oil and "Vaseline" dressings; (*d*) *tulle gras* dressings; (*e*) pressure bandaging. Obviously skin traction is not necessary when the primary amputation is well below the ultimate site of election. In all other cases it must be maintained until such time as (*a*) maximum length has been obtained, (*b*) the danger of further retraction has passed. To a great extent this is a matter of individual surgical judgement.

PLASTIC REPAIR OF WOUNDS AND SCARS.

1. When the primary amputation wound is well below the proposed site of final amputation, whether healed or still open but clean, a formal amputation is performed and the wound is closed.
2. When the primary amputation wound is at or near the proposed site of final amputation, but is open and clean, the skin edges, together with the granulation tissue, and if necessary some bone, are excised. Flaps are fashioned so that if possible an ideal scar is obtained. The wound is closed.
3. When the primary amputation wound is at or near the site of the proposed final amputation, and is healed, the operation is mainly one of excision and rearrangement of the scar, bone being removed if required. After any amputation, if there is any tension of the suture line, skin traction should be applied immediately and maintained until the wound is healed.

Skin Grafting.

Open wounds sometimes require covering before the secondary amputation is performed; for this purpose split skin grafts are excellent. For any covering that is to be permanent, full thickness pedicle grafts are necessary. Even full thickness grafts do not stand up well to the pressure of a prosthesis over weight-bearing points, so that the choice of prosthesis, and even of the level of amputation, is sometimes influenced by this consideration.

Penicillin.

The parenteral administration of penicillin is widely used as a pre-operative and post-operative measure for amputations, and is recommended when it is considered that sepsis may be troublesome.

PREPARATION OF STUMPS FOR FITTING OF A PROSTHESIS.

Prevention of Deformity.

Measures adopted to prevent deformity include (*a*) adequate post-operative splinting, (*b*) early movement of neighbouring joints, (*c*) exercises. With proper supervision, the common deformities of flexion of the knee, abduction and flexion at the hip, and adduction at the shoulder joint should not occur.

Bandaging.

As soon as possible after operation, the stump is firmly bandaged, four-inch or six-inch crepe bandages being used.[2] The bandaging must not obstruct the circulation and is firmer distally than proximally. The stump is rebandaged four times a day and the bandage is worn continuously. The purpose of this it to reduce the œdema and promote shrinkage. Care must be taken that the bandage does not cause deformity; for example, flexion of the hip may result from incorrect bandaging of the thigh stump.

Physiotherapy.

Gentle massage, gradually increasing in frequency and intensity, is used to reduce the œdema. The whirlpool bath may also be used for the same purpose.

Exercises.

Exercises[3] have a twofold purpose: (*a*) restoration of power and orientation of the stump, and (*b*) prevention of deformity. Hitting or kicking a ball with the stump-end, and writing on a blackboard with chalk fixed to the bandages of an arm stump, have been found useful exercises, particularly in assisting the patient in the reorientation of his stump.

Pylons and Temporary Limbs.

When bandaging fails to effect adequate shrinkage of the stump, a temporary limb, which may take the form

of a pylon, is fitted. One drawback to the use of a pylon is that the patient tends to develop a characteristic gait, which may prove difficult to correct. However, the psychological effect of being able to discard crutches is great, and temporary limbs enable patients who have undergone double amputation to acquire a sense of balance and be ambulatory before their permanent prosthesis is fitted.

Complications After Amputation.

The "roll of flesh" which occurs over the origin of the adductor muscles in amputations above the knee, particularly in later years as the patient tends to gain in weight, is a most serious complication. Once established, it is extremely difficult to deal with, but it can usually be prevented by good fitting of the socket, particularly by the making of adequate allowance for the adductor muscles both in repose and in action. Another precaution against its development is to train the patient to pull down his stump sock each time the limb is put on, so as to draw the skin well down into the socket. Once the "roll of flesh" is established, it is necessary for the patient to cease wearing the limb until all inflammation and œdema have resolved. A careful check of the fit is made before the limb is again worn. In certain resistant cases, surgical intervention may be necessary.

Jactitation and painful phantom limbs are extremely rare. Other complications, such as boils, bursæ, sebaceous cysts, ulcerated scar, tenderness, *et cetera*, have all been seen, and are dealt with along orthodox lines.[6]

Indications for Fitting Prosthesis.

A stump is ready for the fitting of a prosthesis when the following criteria have been fulfilled: (*a*) when the œdema has resolved, and an adequate circulation is present; (*b*) when a painless, firmly healed scar is present; (*c*) when the stump can be handled firmly without pain, this denoting absence of nerve irritability; (*d*) when shrinkage has occurred to the extent that a new socket should not be required for about six months.

Blind Patients.

The importance of sensation to a blind patient who has undergone an amputation cannot be over-estimated. For this reason stumps are fashioned as long as surgical principles allow. End-bearing stumps are therefore advised when possible, and upper limbs should always be amputated at the lowest available level.

Specific Amputations for Final Treatment.

Lower Limb.

In amputations of the lower limb, the first to be considered is that of the forefoot.

Forefoot.

If the amputation of the forefoot can be performed in front of the insertion of the *tibialis anticus*, as much of the foot as possible should be saved, as the presence of major muscles controlling the tarsal and ankle joints ensures good control of the stump and the avoidance of latent deformity. The operative technique will depend on circumstances, the aim always being linear scars, which should be placed as far as possible to conform to the requirements of weight-bearing and the wearing of a boot.

Mid-tarsal (Chopart's) Amputation.

Chopart's amputation is almost certain to be followed by an equinovarus deformity, which is crippling and calls for further operative procedures. A secondary cause of trouble frequently seen is an irregular, adherent scar on the antero-superior surface of the stump. The stump, however, is seldom the site of circulatory disturbances and provides a normal weight-bearing surface, and a satisfactory prosthesis can be fitted. Deformity can be prevented by arthrodesis of the ankle, so that when ample skin is available a Chopart's amputation with arthrodesis of the ankle can be recommended. The operation is carried out as follows. A plantar flap must be fashioned of sufficient length to allow the scar to be placed on the antero-superior angle of the stump without tension. Since a common site for subsequent local tenderness is immediately under the prominent head of the astragalus, this bony prominence must be smoothed off. Plaster fixation, irrespective of whether or not the ankle joint is fused simultaneously, should be maintained post-operatively until the wound is soundly healed.

The Boyd Amputation.

In brief, by the Boyd amputation the whole foot distal to the line of the anterior margin of the tibia is removed, together with the astragalus. The *os calcis* is transected at this level and fused to the under surface of the tibia. In a few patients examined the immediate result appeared to be satisfactory, and a good weight-bearing surface was present. None had been fitted with a prosthesis, nor had one even been finally designed, so that beyond the fact that the Boyd amputation represents an alternative procedure when a mid-tarsal amputation is not practicable, no recommendations can be made.

The Syme Amputation.

Opinions differ widely in England and America as to the merits of the Syme amputation. Roehampton figures[6] of 141 consecutive Syme's amputations from the last war showed that the results were as follows:

> Seventy-eight still continued as Syme amputations, and 63 have had to undergo re-amputation to tibial stumps. Of the 78 cases that exist as Syme's, 12·5% have to be fitted with thigh bearing or ischial bearing limbs; 66·8% have to be fitted with limbs in which a portion of the weight is carried on the tibial bearing surface . . . 20·7% continue to take full end-bearing. . . . Of the 63 cases which needed re-amputation, the length of life of Syme's stumps prior to re-amputation averaged 6·01 years.

Canadian experience has been different, reamputation being rarely performed. In Britain no recent Syme's amputations were seen, and as far as is known they are not being performed. A large number of patients who had recently undergone Syme's amputation have been examined in America. Many of these were fitted with a prosthesis, were walking well, and expressed themselves as being entirely satisfied. Of patients who had had bilateral amputations, one below the knee and one of Syme's type, all preferred the latter, because in contrast with the limb amputated below the knee "walking felt more natural". Only a few old Syme's amputation stumps of twenty to thirty years' duration have been seen; some were satisfactory and others were showing obvious signs of deterioration.

The reasons advanced for the failure of Syme's amputations are as follows: (i) faulty selection of cases; (ii) faulty operative technique, mainly (*a*) bad fashioning of the flaps, (*b*) interference with the blood supply to the flap, (*c*) faulty position of the flap, (*d*) inefficient post-operative care; (iii) the presence of sepsis; (iv) faults inherent in the prosthesis, (*a*) weight, (*b*) constriction of the limb; (v) local circulatory failure. None of these difficulties are entirely insurmountable, and it is considered that Syme's amputation will give a satisfactory stump in properly selected cases, provided that the operative technique, post-operative care and limb-fitting are efficient. Unless conditions exist so that the flaps can be properly fashioned through an uninfected field, a below-knee "site of election" amputation is preferred. The latter is always preferred for women, owing to the unsightly shape of the Syme prosthesis.

The technique should follow closely the method originally described by Syme, the essential points being the following: ample skin flaps, including two to two and a half inches of the sole; sharp dissection of the *os calcis* as close to the bone as possible, great care being taken to preserve the blood supply of the distal flap; removal of a very thin shaving of the articular surface of the tibia, and section of the malleoli at the same level; suturing of the skin flaps without tension. When this is completed, it will be found that "dog ears" of skin project at both ends of the wound. These must on no account be trimmed, as with normal shrinking of the stump they disappear, and surgical removal may easily endanger the blood supply of the flap. Great care is taken to fit the bulbous end directly under the tibia, and to maintain it accurately

in position by the dressings, aided by adhesive strapping and bandages.

The post-operative care of the stump is of the greatest importance and should be the personal responsibility of the surgeon in charge of the patient. Different methods of maintaining the position of the flap may be used, varying from daily inspection and adjustment as required to fixation in plaster. Patients are usually confined to bed for three or four weeks after operation. There are two methods of preparing the stump for fitting of the prosthesis, and both appear to give satisfactory results: (i) fixation in skin-tight weight-bearing plaster cast, a rubber pad such as a crutch end being used for a heel piece; (ii) gradually increasing weight-bearing over a period of six to eight weeks, beginning with short daily periods of standing on two pillows and then on one pillow, followed by folded blankets *et cetera*, until full weight-bearing on the naked stump is possible. By either method the stump is usually ready for fitting in approximately eight to twelve weeks from operation.

The Syme Appliance.—One of the main reasons why the Syme amputation sometimes fails is the constricting element present in all the older types of prosthesis fitted to this stump, which must aggravate, even if not acutally cause, venous congestion. All such prostheses seen have been heavy, and obviously the amount of constriction caused by the lacing of the prosthesis is directly proportional to its weight. It is considered, therefore, that if the stump can be fitted with a lighter prosthesis, circulatory failure is less likely. In two centres in the United States of America, light limbs of plastic material are being fitted to these stumps, the weight of the prosthesis being less than three pounds. In addition, in one of these centres the heavy metal ankle joint and reinforcing side pieces have been eliminated, the plastic socket being fixed directly to a wooden footpiece, which has one joint slightly forward of the mid-tarsal level. These patients walk with a slightly more noticeable limp, somewhat similar to that of a patient with an arthrodesed ankle. This prosthesis is still in the experimental stage, and further improvement in the foot mechanism may well minimize this defect. Its durability, of course, has still to be proved. It is considered that the wear and tear on a Syme's stump as well as latent circulatory defects will be minimized by the development and fitting of a light prosthesis. Even with present appliances the Syme amputation has proved to be satisfactory in Canada; and in England, where past experience has been unsatisfactory, reamputations have become much less frequent since the introduction of partial tibial, thigh or ischial bearing for these stumps.

Amputation Below the Knee.

The most satisfactory level for amputation through the leg is five or six inches measured from the line of the knee joint to the end of the tibia. Longer stumps, in proportion to their length, require a heavier and more bulky prosthesis and are more likely to suffer circulatory disturbances with subsequent deterioration. Although shorter stumps become increasingly less efficient and more difficult to fit, it is of the greatest importance to retain the knee joint, since stumps with one and a half inches of tibia have been fitted with a satisfactory prosthesis allowing the use of the knee joint.

A transverse incision, with equal semicircular flaps, or with the anterior flap slightly longer than the posterior flap, is advised. All other incisions are less satisfactory, particularly the antero-posterior incision which retracts between the bones, leaving a deep furrowed scar. The fascia is sutured as a separate layer over the end of the bone, as this prevents adhesions between the bone and the scar. The fibula is divided one inch proximal to the tibia, and the tibia is bevelled on its anterior crest. Short fibula stumps rarely abduct, and except in this event, are an asset in limb-fitting and should not be removed. Fusion of the lower ends of the tibia and fibula is not recommended, because this destroys the valuable spring effect which the presence of the fibula affords. The application of a back splint or plaster cast is advised until the wound is soundly healed, and care is taken to prevent the occurrence of a flexion deformity of the knee. Removal of part or all of the bellies of the gastrocnemii may alter the shape of the stump sufficiently to allow the fitting of a below-knee limb. Removal of the short fibula is of doubtful value in these cases.

Stumps too short for an ordinary below-knee limb are fitted with a kneeling limb prosthesis, which, though heavy in its present form, is satisfactory. The flexed knee provides a satisfactory lasting bearing surface, and is not prone to circulatory changes. The absence of any form of knee-brake mechanism, causing a less perfect gait perhaps than a Stokes-Gritti or mid-thigh prosthesis, is the only serious disadvantage of this form of limb. In actual fact the gait is reasonably good, and the patients are content with their limb.

Disarticulation Through the Knee.

The disadvantages of disarticulation at the knee joint are as follows: (i) difficulty in obtaining sufficient skin flap; (ii) difficulty in obtaining healing of the scar; (iii) bulkiness of the end of the stump, with a consequent heavy, bulky prosthesis; (iv) impossibility of fitting any form of "knee control" mechanism to the prosthesis; (v) the necessity for an outside knee joint, disliked by the limb makers and said to be prone to mechanical defects; (vi) the presence of uneven weight-bearing surfaces, which eventually are said to deteriorate; (vii) poor gait.

I have seen a number of patients who had undergone this disarticulation, including three or four who had been operated on many years previously. All were satisfied with their prosthesis, none showed any deterioration of the stump or weight-bearing surfaces, and all walked well. Stumps recently examined in the United States of America have proved that the healing of the scar is satisfactory with proper operative technique. Modern improvements in prosthesis manufacture should largely overcome the remaining objections to this type of amputation. When there is sufficient skin to obtain a bearing surface free from scar, and when it is not possible to save the knee joint, disarticulation at the knee is a satisfactory procedure.

An anterior flap is required, of sufficient length to cover the whole weight-bearing surface. The patella is removed, and the patella tendon is drawn through the intercondylar notch and sutured to the hamstring tendons. This is an essential step in the operation, as experience shows that this prevents the otherwise inevitable retraction of the hamstring tendons. Since these are frequently adherent to the upper part of the wound, it tends first to stretch and then to gape, with subsequent delay in healing and broadening of the scar.

Long Femoral End-bearing Stumps.

Long femoral end-bearing stumps are not used in Britain, and none were seen there. Roehampton experience[6] has been that, in 1,000 cases, 54% of stumps over twelve inches in length were affected by circulatory disturbances, as opposed to 4·4% of stumps less than twelve inches in length. Canadian experience[6] has been different—namely, that in 480 cases of amputation through the thigh, no more trouble was experienced in stumps longer than ten inches than in shorter stumps. This type of stump is at the moment the stump of choice for above-knee amputations both in Canada and in the United States of America, where a large number of recent and a few long-standing cases were investigated, in all of which the stumps were satisfactory. When fitted with their prostheses, these patients learn to walk well more quickly than patients with mid-thigh amputations. The patients themselves were satisfied with their limbs. It was noted that in a considerable number of cases varying portions of the body weight were being borne by the thigh-piece or ischium, or by both. In the small number of long-standing cases observed there were no circulatory troubles, such as those described in England. Climatic differences have been advanced as one reason for this important discrepancy. Since ischial bearing is not without its disadvantages, and since some of these circulatory troubles at least may well be aggravated by a warm climate, there is a definite place for end-bearing stumps in above-knee amputations.

Stokes-Gritti Operation.—In the Stokes-Gritti operation a long anterior flap is required, so that the scar will be entirely behind the bearing surface. The femoral condyles are transected one and a half inches above the knee joint,

roughly at the level of the adductor tubercle. Care is taken to fit the patella accurately onto the raw condylar surface, where it is fixed by ligatures passing through drill holes in both bones. With proper after-care, the stump is ready for weight bearing ten to twelve weeks from operation.

The Transcondylar Operation.—The transcondylar operation resembles the Stokes-Gritti operation, except that the patella is excised. It appears to have no advantage over the Stokes-Gritti procedure, and the latter is generally preferred.

The Mid-Thigh Amputation.

Once the flared portion of the femoral condyle has been sacrificed, the site of election is at the level of ten to twelve inches of femur, measured from the tip of the great trochanter. As the stump diminishes in length, it becomes progressively more difficult to fit and less efficient. This amputation is regarded universally with favour, and an excellent prosthesis can be fitted to the stump.

Technique.—Equal (or slightly longer anterior) semicircular flaps are used. The fascia is sutured as a separate layer over the bone end. Post-operative treatment is along routine lines.

Hip Disarticulation and Short Femoral Stumps.

Hip disarticulation and short femoral stumps are grouped together, because both types of patients must be fitted with the same type of prosthesis. Any portion of the femur down to—and in larger patients a little below—the lesser trochanter is of great value in limb-fitting and should be preserved when possible. An exception is made in the case of women, for whom for cosmetic reasons the complete disarticulation is preferred.

A posterior flap is used in normal circumstances, but in the great majority of cases encountered the making of normal flaps is not possible. Every effort must be made to keep the scar anterior, and the flaps are planned so that the ischial bearing surface is free from scar. Again, in the preparation of the stump for plastic repair and limb-fitting, skin grafting will be required more frequently than after any other amputation. Full-thickness pedicle grafts are always preferred, as they stand the friction and pressure of the prosthesis better than other forms of graft.

Upper Limb.

Hand.

Conservative surgery, aimed at the preservation of as much as is viable, will in general do most to maintain the three most vital functions of the hand—namely, "grasp, pinch and hook".[7] The wide range of reparative procedures that may be undertaken in the hand, governed as they are by other factors such as scarring, range of movement, anæsthesia, occupation, *et cetera*, is beyond the scope of this report. However, mention is made of (*a*) the fitting of a prosthesis with an opposition peg, (*b*) the fashioning of a "tube and bone graft" opposition digit.

Disarticulation at the Wrist Joint.—In view of the recent improvements in the upper limb prosthesis, particularly in the shape of the light forearm appliance, fitted for disarticulation at the wrist and allowing a useful range of pronation and supination, it is thought that the operation of disarticulation at the wrist joint should not altogether be discarded without further consideration and trial. Since the stump is apparently prone to circulatory changes, and since no satisfactory prosthesis allowing of forearm rotation had been produced, it was formerly considered that the wrist joint was not worth keeping and was in fact less useful than a stump amputated through the forearm with seven inches of ulna. Recent experience with a light leather gauntlet type of prosthesis suggests that the wrist joint may be well worth keeping. Therefore, the reasons for the deterioration of this stump which sometimes occurs, call for further investigation. Suggested causes include (*a*) surgical interference with the blood supply, (*b*) disuse phenomena, (*c*) neurovascular incoordination. The anatomical arrangement of the blood vessels in the region of the wrist joint indicates that the blood supply to the flaps is unlikely to be unduly interfered with in carefully fashioned flaps. Disuse atrophy is the most likely cause of this deterioration, and is paralleled by paralytic conditions affecting the forearm and hand, since with the old type forearm prosthesis the forearm muscles *per se* are not used. In an area rich in nerve supply, neurovascular dysfunction is a possibility, but is less likely to be of importance in a functioning stump. In addition, it is pointed out that experience hitherto has been that many forearm prostheses are never worn, and that "many people would prefer a wrist disarticulation without a prosthesis to a forearm amputation with a prosthesis that they would not wear".[9]

Forearm Amputations.

For previous types of prosthesis, the seven-inch stump measured from the tip of the olecranon was regarded as the most useful. With the introduction of a prosthesis allowing actively controlled rotation, such as a Northrop arm or the Craft appliance, extra length becomes an important asset, since the amount of control or rotation is directly proportional to the length of the stump. Although both appliances have been seen in use, and are impressive, they are still in the developmental stage. There can therefore be little doubt that the risk of ultimate breakdown of a long forearm stump through circulatory or other causes is well worth taking, even if the stump lasts only a few years. It is suggested also that by the continuous use of the forearm stump, this deterioration will be not only postponed, but possibly even prevented. Each case must be judged independently, the occupation of the patient being an important consideration. Generally, however, if the wrist joint has to be sacrificed, the amputation should be performed at a level sufficiently far above the wrist to allow the fitting of a Northrop arm—that is, two or three inches. Equal flaps producing transverse terminal scars are aimed at, and the fascia is sewn over the bone ends as usual.

Disarticulation at the Elbow Joint.

From a limb-fitting aspect, disarticulation at the elbow joint is not a satisfactory procedure. Here, again, attempts have been made to enable a more useful form of prosthesis to be fitted by performing a pseudarthrosis three to four inches above the elbow joint. Such controllable "forearms" have been seen, to which it appeared that some form of below-elbow prosthesis could be fitted satisfactorily.

Amputations through the Arm.

A satisfactory prosthesis can be fitted to stumps four to eight inches long measured from the tip of the acromion process. The available length may be increased by division of the anterior axillary border; but unless there is one clear inch free below the axillary border stump, control of the prosthesis is not possible. Equal flaps are used, the aim being a transverse terminal scar, and the fascia is sutured over the bone ends.

Short Arm Stumps and Disarticulation at the Shoulder.

A short arm stump and a limb disarticulated at the shoulder are of little functional value, and the prosthesis fitted is worn mainly as a dress arm. A few patients manage to gain some voluntary control of the elbow and hand appliance. For those who object to the weight of a useless appendage, a shoulder cap only is fitted. This preserves the symmetry of the shoulders and enables the patient to wear ordinary clothes. If possible, flaps should be planned so as to avoid scars over the outer end of the clavicle or the acromion process.

Forequarter Amputation.

No prosthesis of any functional value can be fitted to patients who have undergone a forequarter amputation. A shoulder cap has great cosmetic value, and is usually worn.

Cineplastic Operations.

No cineplastic operations were seen in England or Canada, and a few only were seen in the United States of America. The operation is now confined almost entirely to intelligent, cooperative patients, who still request the operation after the limitations of the special prosthesis have been fully explained to them. The limitations are

twofold—namely, lack of power that can be transmitted to the controls of the prosthesis, and the fact that no really efficient mechanical hand has yet been designed. It is for precisely these reasons that the operation has fallen into disuse in England and Canada. At the same time, it is emphasized that the fact that the operation has been performed does not preclude the wearing of standard types of prosthesis for heavy work, and that mechanical hands are still capable of being improved possibly to such an extent that the cineplastic operation may be of great value.

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LESIONS OF THE MUSCULO-TENDINOUS CUFF OF THE SHOULDER.[1]

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You are all no doubt fully conversant with lesions of the musculo-tendinous cuff of the shoulder and there is not much in the way of new work or even original findings which may interest you. In this short paper and film I am hoping to give you something of interest which will promote discussion.[2]

Codman has covered the ground wonderfully well and some of his statements are worth remembering. His first statement of the importance of the subacromial structures in relation to painful shoulders cannot be emphasized too much nor the frequency with which such conditions are diagnosed as strain, muscular rheumatism, neuritis or arthritis. The more one studies these conditions, the more the diagnosis alters from such general terms; but even with concentrated study the diagnosis is not always easy, although one comes a little nearer the correct answer.

Here at the outset I would stress the value of an accurate and full history and a demonstration as nearly as possible of what actually happened if the injury was the result of some accident.

CLASSIFICATION AND GENERAL DISCUSSION.

The following conditions may be studied to some degree in relation to the subject of this paper and to the condition of painful shoulder: (i) bursitis, (ii) strain of the musculo-tendinous cuff, (iii) supraspinatus tendinitis or tendinitis of the musculo-tendinous cuff, (iv) partial rupture of the musculo-tendinous cuff, (v) complete rupture of the musculo-tendinous cuff, (vi) calcification in the supraspinatus tendon and frozen or silent shoulder.

Bursitis.

As McLaughlin says, bursitis is no more a diagnosis than headache or jaundice. It is mainly a secondary condition, usually having no connexion with the primary lesion other than proximity. However, primary bursitis does exist under certain conditions. Such conditions are shown in the history of the following case.

A man, aged forty years, not usually engaged in manual labour, decided to put up a new fence at his home one Sunday, and during this work he nailed in about 800 nails, thus using his shoulder in practically the same motion 5,000 times. That night pain developed in the shoulder, which became so severe that a large injection of morphine was needed for some relief; this pain was accompanied by practically complete limitation of movement in all directions. Relief was obtained only after several weeks' treatment by rest, manipulation and physiotherapy.

This overuse of a joint not trained for such action is the common cause of primary bursitis.

Strain of the Normal Musculo-Tendinous Cuff.

I have placed strain of the musculo-tendinous cuff second in my classification, for the following reasons: (*a*) it occurs only in the younger age group; (*b*) prior to the injury there is no abnormal condition of the joint; (*c*) it is analogous to similar strains about other joints. In this type of painful shoulder the patient is in the younger age group, generally aged up to thirty-five years, and having good musculature and no symptoms related to the shoulder prior to the condition of which he complains. The history is usually of a strain of either a minor or a more severe nature. Three such cases are to be illustrated in the film: Case I, in which the patient sustained a severe fall on the side of the arm; Case II, in which a young man was throwing a cricket ball, playing a game in the early part of the season before his muscles had been trained to this new action; Case III, in which the weight of a cast was suddenly taken by the left arm.

When such patients require operation, as in Cases II and III, the musculo-tendinous cuff is strong and of normal thickness and no attrition of the tendon or much change in the bursal structure is found.

What, then, is the pathology of this type of strain? I consider that it is analogous to similar strains, such as a sprained ligament about the ankle or knee joint. Owing to the sudden strain a few fibres of the tendon are pulled away at or very close to their insertion into the bone; after this, mild hæmorrhage with subsequent œdema takes place. If the limb was rested in a position of relaxation, revascularization would soon take place and recovery follow. As the tendon is such a strong structure, there is practically certain to be no tear of the type seen in the later age group.

The symptoms and signs in these cases are usually as follows: (i) pain at the time of injury and later referred pain to the insertion of the deltoid, in the supraspinatus muscle or the side of the neck—pain especially at night; (ii) a local point of tenderness near the point of the shoulder; (iii) infrequently limitation of muscle power; (iv) a degree of faulty scapulo-humeral rhythm; this I shall discuss more fully later.

The treatment of these patients can be considered under three headings: (i) patients examined early, (ii) patients examined within a few weeks of the onset, (iii) patients examined some months after the onset.

Patients Examined Early.

Complete rest on a suitable abduction splint is required, the arm being kept in nearly full abduction and nearly full external rotation. The period of immobilization varies, but is usually from two to three weeks; during this time physiotherapy and muscle training without movement can be given.

I should like to state here that good results are not likely to be obtained when the splint is uncomfortable or allows the arm to get out of position. One type of splint I had was moderately satisfactory, but a splint made in accordance with the instructions of Henry H. Jordan (*The Journal of Bone and Joint Surgery*, July, 1944) will, I hope, keep the arm in constant correct position and give comfort.

Patients Examined Within a Few Weeks.

The introduction of 1% "Novocain" solution into the tender spot is helpful, but not in the early case, as the reaction is too great.

Patients Examined Months Later.

You will see by the remarks to be made about two cases recorded in the film that operation may be necessary.

[1] Read at a meeting of the Australian Orthopædic Association, Brisbane, June, 1946.
[2] Dr. Gunning later showed a cinematograph film illustrating the lesions in 11 cases.

Supraspinatus Tendinitis or Tendinitis of the Musculo-Tendinous Cuff.

Supraspinatus tendinitis again is an entity in some respects, but I consider that it can occur only in the older age group. The condition relies on the underlying pathological change which has been gradually taking place—namely, attrition of the bursal wall, loss of its protective mechanism and subsequently the repeated minor traumata to the underlying tendon against the under-surface of the acromion leading to degenerative changes in the tendon. This degeneration predisposes the tendon to tears from slighter injuries and to tears in varying positions, and also to calcification.

The early symptom of this condition is usually aching in the shoulder, intermittent, and present over a period of weeks or months, but not necessarily related to any minor or major strain. Treatment by physiotherapy and limitation of the patient's usual activity is mostly sufficient. However, such a patient is more likely than another to sustain a tear after a minor strain, and it is mostly at this stage that he is usually examined. If questioned, he often gives a history suggesting previous tendinitis, but after the mild strain further symptoms of pain occur and the findings are similar to those stated previously in the discussion on strains of the tendon, leading to a close analogy to those of partial rupture of the supraspinatus tendon.

Partial Rupture of the Musculo-Tendinous Cuff.

Partial ruptures usually occur in the supraspinatus portion of the tendon, but the other short rotators may be involved. Another most important point must be always borne in mind, that such tears can occur anywhere from the musculo-tendinous junction to the insertion of the cuff into the humerus. The reason for this has been stated above—a condition of attrition of the tendon has developed, making a great difference in its tensile strength.

Codman gives a list of 18 conditions, symptoms or signs which indicate a complete rupture of the musculo-tendinous cuff and which should be present within twenty-four hours after the accident: (i) occupation: manual labour; (ii) age: over forty years; (iii) no symptoms in shoulder prior to the accident; (iv) adequate injury—usually a fall; (v) immediate sharp, brief pain; (vi) severe pain on the following night; (vii) loss of power in elevation of the arm; (viii) negative X-ray findings; (ix) little, if any, restriction when stooping; (x) faulty scapulo-humeral rhythm; (xi) a tender point; (xii) a sulcus and (xiii) an eminence; (xiv) at the insertion of the supraspinatus, (xv) which cause a jog, (xvi) a wince and (xvii) soft crepitus as the tuberosity (xviii) disappears under the acromion when the arm is elevated, and usually also as it reappears during descent of the arm. Given these conditions, the diagnosis of complete rupture is easy.

It is the partial and variable type of tear which causes the greatest difficulty in deciding the diagnosis, as certain of the conditions are fulfilled and others are missing, and even those present vary considerably from case to case.

In cases of painful shoulder in which there is a possibility of a tear of the tendon, the time lag since the original injury is important. In an early case there is not likely to be the added chronic bursitis with accompanying aching about the shoulder and its effect in limiting some movement. Nor is there likely to be any calcification in the tendon which may have given rise to a flare-up of symptoms, as in cases of longer duration. Furthermore, the diagnosis is often obscure, in that a tear, either partial or complete, can occur with no other history than a complaint of a painful shoulder. This has been mentioned by Dr. Wilson, of New York, and also I am showing in the film pictures from one case in which the man states definitely that he does not remember any injury prior to the complaint of pain in his shoulder occurring a few weeks before.

I have found the study of the scapulo-humeral rhythm in these cases of most value as a single entity. When the patient is examined from the back it can be seen that in comparison with the other side, if normal, the lower angle of the scapula moves sooner and has a wider range of movement towards the axilla and that rotations of the arm show a greater movement of the scapula. Observe the movement of the arm out to the horizontal and then to complete elevation, and again back through the same range (although the patient may need some help to gain full elevation). During the first half of the ascent the scapula and humerus move together—that is, the arm is still in a position of flexion in relation to the scapula. In the second half more movement takes place at the scapulo-humeral junction. During the first half of the descent the scapula and humerus again move together—that is, descent is at first in extension, the arm quickly dropping to the side from the horizontal. Codman's slogan—ascent in flexion and descent in extension—is worth remembering. The complete change of function is not always present, but I think it can be noted to some degree in nearly every case. Now observe the same movements when the stooping position is adopted; the movements are practically free from pain and the normal scapulo-humeral rhythm nearly takes place.

In these cases also there is often more power of movement than one would expect from the lesion if it is examined later at operation.

Finally, every case is different, and a careful study of all the conditions noted must be considered before the diagnosis is made.

Treatment of the Partial Lesions.

Treatment of partial lesions will depend on the degree of disability noted during examination. If one considers that the lesion is small, similar treatment to that of strains of the tendon as stated above is often sufficient, with perhaps a longer period of immobilization and physiotherapy and special stress being laid on exercises given in the stooping position. Similar treatment should be tried at first and the progress noted, even in what may be considered to be more serious lesions, as many such patients may recover.

Should conservative treatment bring slow results, then the experience and judgement of the surgeon must decide whether and when operation is to be undertaken. I am sure that conservative treatment should not be discarded too soon, as the amount of recovery may be sufficient for the subject, and also the period of treatment does not interfere unduly with the final result after operation. But I also feel that waiting for many weeks or months is unnecessary. In one case illustrated in the film recovery occurred after eight weeks.

Operative Treatment.—The operative procedure which I have employed has been as follows: (i) subperiosteal stripping of portion of the deltoid; (ii) inspection and, if necessary, the removal of portion of the acromion process; (iii) the repair of the lesion, usually by silk sutures of the lace pattern with the ends tied after being passed through the tuberosity; (iv) after-treatment—the application of an abduction frame for varying periods, with physiotherapy. Every patient for operation shows such a variety of lesions that the final technique of repair must be decided after the lesion is defined; whether the repair gives a better result if fascia is used I am unable to say. Moreover, the lesions may be hidden; hence an exploration must be made.

After-Treatment.—From personal experience I can speak of the importance of a careful follow-up. In Case IX illustrated on the film improvement appeared to be very slow until I watched the exercises being performed myself each clinic day; by encouragement and demonstration the patient began to show improvement quickly.

Complete Rupture of the Musculo-Tendinous Cuff.

I think you will agree that complete rupture of the musculo-tendinous cuff is relatively easy to diagnose and the best treatment is surgical. McLaughlin considers that the condition can be treated by repair of the cuff; this is possible in certain cases, but in others treatment of the lesion may not give a satisfactory result except by arthrodesis of the shoulder, as Bosworth states. Here the decision must be made before operation and preparation must be

made if it is thought likely that arthrodesis may be necessary.

There are two other conditions which must be considered in conjunction with such lesions as those under discussion — namely, calcification in the supraspinatus tendon and frozen or silent shoulder. I have mentioned the pathological conditions under which calcification may occur; but when it is present it may be symptomless or may flare up and give rise to symptoms similar to those of a lesion of the supraspinatus tendon. One such case is illustrated in the film. Codman makes a slight note on this type of lesion.

Frozen or silent shoulder is a definite entity and practically always occurs in the middle-age group, mainly in women. I have mentioned it here to say that the adhesions are not necessarily in the bursa; but as Neviaser's observations show, the essential pathological condition is a thickening and contraction of the capsule, which becomes adherent to the humeral head. These patients, when examined in the stooping position, always show a loss of scapulo-humeral rhythm.

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GRAMOPHONE RECORDINGS OF CARDIO-VASCULAR AND RESPIRATORY SOUNDS.

By E. H. Stokes.
Sydney.

One of the difficulties in the demonstration of auscultatory findings lies in the fact that patients with characteristic signs are frequently not available when required. In order to remedy this defect, and to assist but not to replace clinical study, I sought the cooperation of Mr. L. A. Hooke, managing director of Amalgamated Wireless (Australasia) Limited. This company has now produced thirteen double-sided disks entitled "Cardio-Vascular and Respiratory Sounds" (with recordings of the actual sounds) which can be played repeatedly.

After an introduction by Dr. Robert Scot Skirving, who was the first lecturer in clinical medicine at the University of Sydney, and who occupied that office from 1889 to 1911, there are some further introductory remarks. Then follows a description of cardio-vascular sounds which comprises the normal heart sounds and their variations, a discussion of murmurs and the various changes of sound and rhythm found in congenital abnormalities, rheumatic heart disease, cardio-vascular syphilis, thyreotoxic heart disease, hypertensive cardiac disease and the degenerative heart disease of old age. The respiratory section deals with the breath sounds (normal and abnormal), accompaniments, normal vocal resonance (and its variations), and other signs (Hippocratic succussion and the bell sound).

For the preparation of the records a large number of patients were examined, and about 700 sound tracks from almost 200 patients were made. In the manufactured disks 131 sound tracks from these selected patients were inserted in the appropriate places. With the exception of the last (or revision) disk on which the five sounds were recorded directly from the patients, all of the other sounds were reproduced from "master" records taken at various times. Every effort was made to verify the diagnosis of the lesion present by electrocardiographic, phonocardiographic and radiological methods. Two of the patients suffering from patent *ductus arteriosus* and the patient with an arterio-venous communication were operated upon. The consolidated lung from a patient with bronchiectasis and from whom the second example of tubular breathing was obtained was removed at operation. Autopsies were performed on the first patient with mitral stenosis, on the patient suffering from syphilitic aortitis presenting the Austin Flint murmur and on the patient suffering from pericarditis.

An indexed booklet giving the actual words of the records and instructions as to how to play them has been prepared.

The following is Dr. Scot Skirving's introduction:

> The records to which you are about to listen have been prepared in the studios of Amalgamated Wireless (Australasia) Limited by Mr. V. M. Brooker with the assistance of Mr. P. M. Farmer and Mr. E. J. Giles from patients selected by Dr. E. H. Stokes, of Sydney. While records of heart sounds have been made frequently, this is, as far as I know, the first occasion on which an attempt has been made to record the various respiratory phenomena noted on auscultation.
>
> Of recent years, the importance of auscultation, which was practised with great skill by physicians of former generations, has been too much overshadowed, as I think, by the introduction of highly useful ancillary methods of investigation such as radiology and electrocardiography. But every physician knows that certain cases of aortic and mitral disease in their early stages are diagnosed primarily and principally by the use of the stethoscope. Furthermore, in cases of acute respiratory disease in which it may be impossible to subject the patient to X-ray examination, auscultation with other means of physical examination still remains of supreme importance.
>
> Therefore it is essential that students and practitioners should be familiar with the normal heart and breath sounds and their pathological variations. This familiarity can be achieved only by actual clinical study which nothing can replace. I am sure Thomas Sydenham would approve of what I am saying.
>
> These records have been prepared in order to assist clinical investigation, and it is hoped that they will achieve their object, and increase the interest in plain roast-and-boil bedside examination. May these things be. Lest we forget!!

I wish to thank Dr. Harold Ritchie and Dr. A. W. Holmes à Court for valuable suggestions, and Dr. Douglas Anderson, Dr. T. J. Biggs, Dr. Donald Vickery and Dr. D. G. Carruthers and many others for their assistance.

In a following article Mr. V. M. Brooker has given a description of the methods which he used in recording the sounds.

THE RECORDING OF CARDIO-VASCULAR AND RESPIRATORY SOUNDS.

By V. M. Brooker,
Fellow of The Institute of Radio Engineers and Broadcasting Manager of Amalgamated Wireless (Australasia), Limited.

In 1941 an attempt was made to record upon gramophone disks a series of heart sounds, both normal and pathological, with a view to the recordings being used in medical schools to supplement the established methods of teaching in normal and in rare pathological conditions, and it was hoped that the records would prove of value as references.

It was thought that in those pathological conditions rarely encountered, the recordings would have a wider field of interest and greatly assist the student by conserving valuable time. It was later decided to include respiratory

ment of equipment and operational technique, as the frequencies of some of the components encountered in respiratory sounds are approximately the same as those due to thermonic agitation within the electronic valves which create a constant background of noise of varying amplitude which is inherent in such amplifying systems. sounds in the work, and this addition called for a readjust-

The factors involved in auscultation become more pronounced, more involved, and are capable of being the subject of wider margins of error when the acoustic stethoscope is replaced by an electro-acoustic transducer. These points, whilst introducing new problems, may be effectively controlled, with the result that the limitations of the acoustic stethoscope are offset by the use of more sensitive apparatus that may be controlled over a wide range of frequencies, and its sensitivity adjusted to meet the requirements of the moment.

The application of electronics to acoustics, and the studies in the psychology and physiology of hearing have afforded many new avenues of approach to the subject of auscultation, not the least of which may be ear fatigue when harkening to sounds of low intensity and frequency for protracted periods.[1]

It should be noted here that in the making of these recordings we were not faced with the problems associated with the production of a satisfactory electrical stethoscope, limited as it could be by varying voltages, lightly constructed amplifiers and associated equipment. We were able to employ substantially constructed high quality amplifiers, measuring equipment, bulky but suitable transducers that could not conveniently be associated with the electric stethoscope, with the result that the equipment used in picking up the sounds to be recorded was reliable and stable in operation.

It has, for practical purposes, in carrying out this work been necessary not only to assume that the ears and stethoscope yield satisfactory results, but to ensure that our system from electro-acoustic transducer to gramophone record did not, within the limits of auditory perception, introduce directly or indirectly any unaccounted-for sounds that might be capable of misinterpretation.

The earlier workers—Hermann, Wiggers, Gerhartz, Einthoven, Roberts, Hall, Williams, Sell and Trendelenburg—all faced the same problems—inadequate apparatus and facilities. Those disabilities have now been largely overcome or equipment has been developed to the point where it could be utilized with a considerable measure of success.

There is, however, work still to be done and apparatus to be developed, especially where it is desired to study and record such items as the masking effects of certain sounds on other sounds of interest in auscultation. It is pointed out that other mediums of recording may have been employed to greater advantage in the making of these records; but those advantages, it is believed, were more than offset by the high cost of the apparatus necessary with which to reproduce those sounds, the degree of skill necessary to maintain the equipment in an acceptable state of perfection, the danger of random noise being unknowingly introduced into the sound-reproducing system, and the somewhat noisy nature of the reproducing equipment itself.

In setting up a suitable electro-mechanical disk recording system it was first necessary to determine the frequency band that would yield adequate results. It appeared that a system having a characteristic response curve that is flat between 30 cycles per second and 2,000 cycles would meet all requirements. It was early apparent that infrasonic sounds reach the chest walls, but as those were beyond the scope of auscultation, no attempt was made to ascertain their effect on the sound pattern as a whole. Failure to take these very low frequencies into account has possibly had some effect on the work, but to what extent it is not yet known; but it is not likely to be of a serious nature. It is suggested by way of illustration that the effect may be somewhat similar to that which would be experienced by the listener to the performance of a musical work on a grand organ if the 16-cycle pipe were removed. The 16-cycle note is possibly more felt than heard, but its elimination leaves the listener with a sense of loss.

It would appear that most of the frequencies of interest in auscultation are those occurring below 1,000 cycles per second, but as the result of the examination of a number of appropriate sound tracks, it is suggested that the figure of 1,000 cycles is too low and that in bronchial breathing frequency components observed may be as high as 1,500 cycles.

From the foregoing it would seem that successful recordings could have been made with suitably sensitive equipment having a flat frequency characteristic from 30 cycles per second to 2,000 cycles per second, but this did not prove to be the case. When the upper end of the frequency band was limited to 2,000 cycles per second some recordings were made that appeared to be of very satisfactory quality having a somewhat lower level of background noise which gave good auditory definition to the sounds; we were, however, of the opinion that the recorded sounds had lost something of their character and that it was preferable to have a somewhat higher background of noise than to lose any part of the characteristic quality of the sounds. In this connexion it is pointed out that random noise is directly proportional to band width, and any increase in the latter will increase the amount of noise passed into the system, all or part of which may cause masking effects of the wanted recorded sounds. It was finally decided to use a system that yielded a substantially flat frequency response between 30 and 4,500 cycles per second. It was further found that in recording sounds of relatively great intensity, such as those frequently encountered in the mitral region of the heart, better results were obtained with the wider band amplifier.

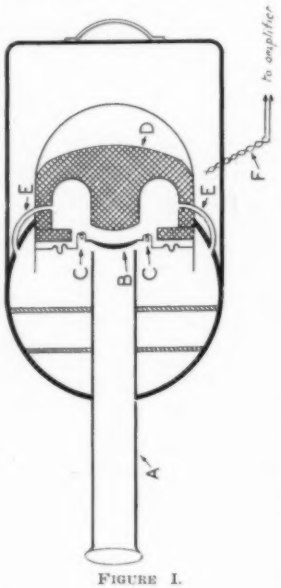

FIGURE I.

It is proposed to produce recordings with amplifiers having frequency responses limited to specified bands to take care of specialty work where it is important that not only background noise be reduced to a minimum but other normal body sounds be eliminated. In this manner it is possible to filter out the heart sounds or greatly to reduce their amplitude when it is desired to study faint respiratory sounds. In some cases the extreme sensitivity of the transducer and its associated amplifier will reveal fairly strong heart sounds at locations where the acoustical stethoscope would hardly reproduce them.

None of the available electro-acoustical transducers were quite suitable for this work, and it was necessary to develop equipment that was easy to handle and which would give acceptable results. It will be appreciated that the transducer connected to the amplifier in the highly sensitive condition necessary to pick up the feeble respiratory sounds was a serious problem, as the sounds made by the movement of the bones in the fingers and wrist of the operator were transmitted to the transducer with unsatisfactory results. This problem was largely overcome by training the operator to carry out the work in an expeditious manner and to hold the transducer in a manner that called for a minimum of movement.

Skin movement of the patient was a source of sound that was capable of masking the sounds to be observed, and

that condition was aggravated when the skin carried even a light growth of hair.

The transducer used for the work consisted of a bell-mouthed glass tube one and one-sixteenth inches in diameter and five inches in length. It was found that this cross-section[2] of the search tube favoured the very low frequencies which were of particular interest. The tube was supported by passing it through a heavy rubber sphere to a depth of one and a half inches, where it is suitably anchored, and at the opposite side of the sphere and protruding into its interior is a metal assembly which carried a magnetic circuit, a diaphragm and coil of wire, commonly known to the sound engineer as a voice coil. The sound waves passing along the glass tubing impinge upon the diaphragm, causing it to vibrate at the frequency of the incoming sound waves, and the small coil of wire (voice coil) mounted on the diaphragm is thus caused to vibrate in the magnetic field and the resultant electromotive force induced therein is passed through the electronic amplifiers, the output of which is applied as the driving force to the electro-magnetic recording head, the stylus of which cuts the sound track in a lateral plane on the surface of the "master record".

The electro-acoustical transducer (Figure I) used in picking up the sounds from the chest wall is divided into three main sections, the first section consisting of the search tube (A) and diaphragm (B), the second section consisting of the voice coil (C), the magnetic field produced by the permanent magnet (D) and the air pressure stabilizing tubes (E), the third section, the circuit (F) connecting the voice coil to the electronic amplifiers. For convenience, the first section of the apparatus may be considered as replacing the pinna and ear canal which terminates in the tympanic membrane, the second section as replacing the ossicles of the middle ear and the air pressure stabilizing tubes, the Eustachian tubes, and the third section, the connecting circuit and amplifier, as replacing the inner ear.

In dealing with persons having thin, bony frames, it was often found convenient when applying the transducer to the body to depress the rubber sphere so that a partial vacuum was created and the skin was sucked to the mouth of the search tube, this making a firm, non-noisy contact with the skin of the patient.

Throughout the making of the recordings we have at all times endeavoured to place on the disks sound tracks that, if not at all times identical with similar sounds heard through an acoustical stethoscope, at least bear a striking resemblance to the great majority of them. The electronic amplifiers introduced a slight background noise due to thermonic agitation, but this has not masked the sounds to be observed to their detriment, and in any case it has the advantage of being a known quantity and readily recognizable. In that connexion it is pointed out that the physician cannot always be sure of the ambient noise level in which he makes his examination, or of the effect of such sound waves on the frame of the patient.

It must also be taken into consideration that in increasing the volume of the sounds, as we have done, to make these feeble sounds audible in sufficient volume to provide easy listening in a room or hall, the pitch has undergone some change. Frequency of a sound wave is the number of cycles per second executed by the particles of the medium in which a sound is being propagated. Pitch is that subjective quality of a sound which determines its position in a musical scale. Pitch may be measured as the frequency of a pure tone having a specified sound pressure which seems to the average ear to occupy the same position in a musical scale. Thus it will be seen that there is a definite distinction between frequency and pitch. For example, a tone of a fixed frequency of a few hundred cycles decreases in pitch as the intensity is increased.[3][4]

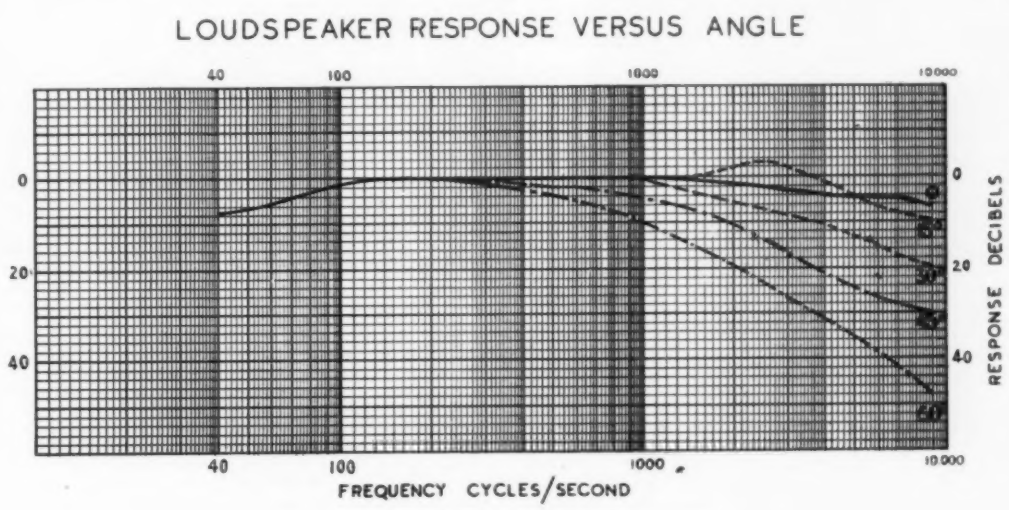

Figure II.

It was mentioned above that pitch decreases with an increase in intensity, and for that reason care should be exercised to ensure that the level of the sound emanating from the loud speaker should be reduced to the lowest level compatible with easy listening.

It is a well-established practice in the recording art to record sounds at the greatest amplitude permissible without distortion of the original wave form for the purpose of achieving the greatest ratio between the wanted sounds and those unwanted sounds inherent in the system, which on occasion are capable of masking the particular sound that it is desired to record. Masking is the reduction of the ability of the listener to hear one sound in the presence of other sounds. In the case of the sound of a pericardial rub it was found desirable to use as recorded examples rubs that were substantially lower in frequency than the band of frequencies that constitute the background noises inherent in the recording system employed to make these records.

All of the equipment employed in the production of these recordings is so well known to the sound-recording engineer that it is considered unnecessary to comment further on its design.

For all of the equipment and facilities used in the work we were indebted to Amalgamated Wireless (Australasia), Limited, Sydney.

It is recommended that the listener to these recordings should take up a position approximately four feet distant and immediately in front of the loud speaker; it is desirable also that the loud speaker should be not more than one foot above or below the height of the listener's head.

From Figure II it will be noted that substantial differences occur as the listener moves from the axis of the loud speaker, and to obtain optimum results it is necessary to select the position for listening. It will be noted also that loud speaker response falls sharply on the higher frequencies as the angle increases, and although it is not severe at 1,000 cycles, experience indicates beyond doubt that it is noticeable.

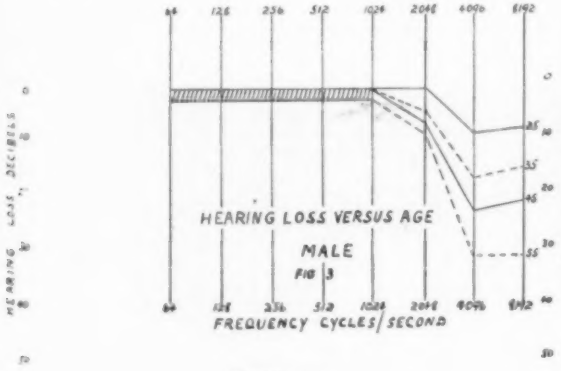

Figure III.

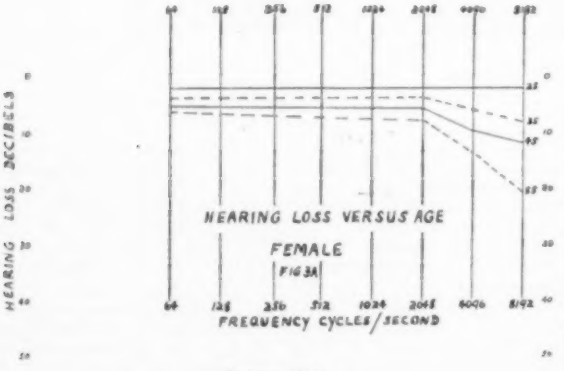

Figure IIIa.

Figures III and IIIa indicate the magnitude of hearing loss *versus* age for forty male industrial workers and forty females engaged in clerical occupations, and here again, whilst the loss is not as great at those frequencies which are of interest in auscultation, it must be considered that from the starting point when the electro-acoustical transducer is applied to the chest wall until the loud speaker reproduces the sounds that impinge upon the tympanic membranes many minor imperfections are possible in the various stages of the process; all in themselves are relatively unimportant and may cancel each other, but the possibility of an additive effect should not be overlooked.

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(2) W. T. Bartholomew: *Loco citato*, page 103.
(3) F. Olsen: "Elements of Acoustical Engineering", page 322.
(4) *Journal of the Acoustical Society of America*, Volume IX, 1937, Number 1, page 1.

Reports of Cases.

FRACTURE-DISLOCATION OF THE SPINE WITH LOCKED ARTICULAR PROCESSES.

By Henry M. Hill,
Major, Australian Army Medical Corps.

Clinical Record.

Gunner G., aged thirty-one years, was admitted to a military hospital on December 10, 1945. The history was that while celebrating his discharge from the army with two friends, he had been involved in an accident about half an hour previously and been knocked down by a tram. His friends lifted him to the side of the road, one by the shoulders the other by the knees, causing acute flexion of the spine.

On his arrival at hospital he complained of severe pain in the back. On examination he was in a state of severe shock. Abrasions were present over both scapular regions, and an acute angular kyphosis at the dorso-lumbar junction with much œdema and tenderness was observed. There were no signs of spinal cord damage. A diagnosis of fracture-dislocation of the spine at the dorso-lumbar junction was obvious. An immediate X-ray examination revealed a gross crush fracture of the first lumbar vertebra with about one-third of an inch forward displacement of the twelfth dorsal vertebra on the first lumbar vertebra (Figures I and II). A study of the antero-posterior view showed wide separation of the spinous processes of the twelfth dorsal and first lumbar vertebræ, while the lateral articular processes were only just touching each other.

Next morning, after an injection of morphine and hyoscine, the injured area was infiltrated with a 1% solution of procaine. Traction in the long axis of the spine together with hyperextension was applied by suspending the patient by the ankles to a hook in the ceiling. Considerable improvement in the clinical deformity was effected by this manœuvre, but full correction could not be obtained. Subsequent X-ray films showed improvement in the shape of the first lumbar vertebra, but no change in the dislocation. Locking of the lateral articular processes was considered certain, and after consultation with Major McKellar Hall open reduction was considered the only course open.

On December 15, 1945, after preliminary injection of morphine and hyoscine with the patient in the prone position, the area was infiltrated with 1% procaine solution as previously. A mid-line incision was made and a large hæmatoma evacuated. The spinous processes of the twelfth dorsal and first lumbar vertebræ were identified. The interspinous ligament between these spines was completely ruptured, as was the sacrospinalis muscle for about one inch on each side. The articular processes were found locked on both sides. To attempt reduction without removing an articular process a rib separator was placed between the spinous processes of the affected vertebræ. These were quietly levered apart until the articular processes were unlocked. The spine of the twelfth dorsal vertebra was then grasped with strong bone-holding forceps and lifted in a dorsal direction until correct alignment was effected. At this stage the rib separator became dislodged and the articular processes immediately slipped into their normal position. The wound was closed and a plaster of Paris jacket applied by the same technique as on the previous occasion. Subsequent X-ray films showed complete reduction of the dislocation as well as of the fracture (Figures III and IV).

The patient was kept in bed for a month before walking was allowed. He then commenced exercises and walking. After another two weeks the jacket was changed. The wound was found perfectly healed and the sutures were removed. General activity was gradually increased, and exercises of a more severe nature were allowed. Twelve weeks from the time of operation a Thomas back support was supplied for wearing during the day. No support was considered necessary at night. At present the soldier has no complaint of backache whatever. There is consider-

ILLUSTRATIONS TO THE ARTICLE BY DR. ELIZABETH McCOMAS.

FIGURE I.

CASE I.—Mrs. C.O. Well-developed *coxa vara* on the left (the hip which was known to be affected by Perthes's disease in childhood). Some *coxa vara* on the right, suggesting that this hip was also affected, though it produced no clinical manifestations.

FIGURE II.

CASE II.—Robert B. Left hip shows early signs of fragmentation in the head of the femur. No change is apparent in the femoral head on the right side, but the angle of the neck is nearer the right angle than would be expected at the patient's age.

FIGURE III.

CASE III.—J.B. In both hips are seen pronounced fragmentation and flattening of the capital epiphyses, with widening of the neck of the femur.

FIGURE IV.

CASE IV.—Ross B. Gross *coxa vara* is seen in both hips. The appearances suggest the end result of bilateral Perthes's disease.

ILLUSTRATIONS TO THE ARTICLE BY Dr. HENRY M. HILL.

Figure I.

Figure II.

Figure III.

Figure IV.

able limitation of movement at the affected area, and in view of the extensive damage to bone and soft tissue this is expected to be more or less permanent.

Comment.

The points of interest in this are, firstly, the entire absence of spinal cord damage in spite of the gross deformity, and secondly, the method of reduction. Watson-Jones and Böhler both describe reduction by excising the lower facet on one side, when reduction becomes easy. The ease with which reduction was effected in this case suggests that the method might be used to advantage in other cases before recourse is had to removal of an articular facet.

Acknowledgement.

My thanks are due to the Director-General of Medical Services for permission to publish this case.

A CASE OF JUVENILE ESSENTIAL HYPERTENSION WITH ENCEPHALOPATHY.

By Murray A. Jackson,

From the Department of Medicine, University of Sydney, and the Professorial Unit, Royal Prince Alfred Hospital, Sydney.

Cinical Record.

R.D., aged sixteen years, was in his usual health until February 21, 1946, four days before his admission to the Royal Prince Alfred Hospital. On this day his father noticed that the boy's eyelids were swollen, and sent him to a doctor. Examination revealed a blood pressure of 220 millimetres of mercury (maximum) and 90 millimetres (minimum). The urine, on being boiled, contained a deposit of albumin of one-quarter of its volume. A diagnosis of acute nephritis was made and the patient was sent to bed. On February 22 he complained of dimness of vision, but otherwise felt well. On the next day he had a convulsive seizure; this lasted for ten minutes. Venesection was performed, and the patient recovered. On February 24 he complained of severe headache, blurred vision and increasing drowsiness.

When the patient was admitted to this hospital on February 25 he was comatose. On examination his blood pressure was found to be 160 millimetres of mercury (maximum) and 90 millimetres (minimum). The pulse rate was 58 per minute. The radial vessels were much thickened. Ophthalmoscopic examination revealed slight blurring of the margins of the optic disks. The urine had a specific gravity of 1,026, and on being boiled contained a deposit of albumin amounting to one-quarter of its volume. Microscopic examination revealed a few blood cells, but no casts. There was no œdema of the face and hands, and the kidneys were not palpable. The blood count gave results within normal limits. The blood urea content was 50 milligrammes *per centum*, and the carbon dioxide combining power was 38 volumes *per centum*; for the method used (Van Slyke), this last figure was probably within normal limits. Examination of swabs of the throat revealed no pathogenic organisms. Lumbar puncture was performed and the cerebro-spinal fluid was found to be clear, under a pressure of 130 millimetres, and free from abnormal constituents.

The patient had passed but 14 ounces of urine in forty-eight hours, so he was given an intravenous injection of 400 millilitres of 4·285% sodium sulphate solution in 10% glucose solution, in an attempt to stimulate urinary secretion. The day after his admission to hospital he regained consciousness and passed 25 ounces of urine. This urine had a specific gravity of 1,024, and the deposit of albumin when the urine was boiled was one-quarter of its volume. The blood pressure was 170 millimetres of mercury (maximum) and 100 millimetres (minimum).

Feeding was commenced with small amounts of orange juice and citrated milk. During the following week the patient was free of symptoms and consuming a light diet. The urinary output was normal, the specific gravity of the urine was high, and albumin was absent after the fourth day. The blood pressure fell to a minimum level of 135 millimetres of mercury (maximum) and 95 millimetres (minimum) on March 9 (see Figure I). The blood urea level fell to 24 milligrammes *per centum*. Ophthalmoscopic examination revealed normal optic disks.

From February 10 the blood pressure began to rise steadily and reached a level of 180 millimetres of mercury (maximum) and 100 millimetres (minimum) on February 18, at which level it has remained since. The patient still feels well. The urine contains no abnormal constituents. The blood urea level is 40 milligrammes *per centum*. Renal function tests reveal slight but definite impairment of function, detected by the urea concentration and phenol-

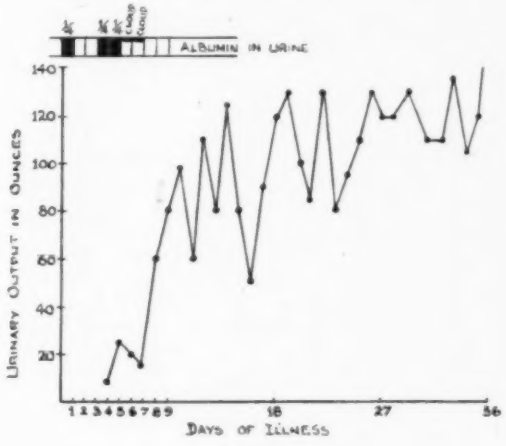

Figure I.

sulphonephthalein tests. Radiographic examination of the chest reveals no enlargement of the heart. Ophthalmoscopic examination reveals normal retinal vessels. No arterial calcification was seen on radiographic examination of the limbs. No pathogenic organisms were isolated from the upper respiratory tract, and there was no history of sore throat or of previous renal disease.

Discussion.

This is considered to be a case of juvenile essential hypertension, with a crisis of hypertensive encephalopathy, which was mistaken for acute nephritis. Consideration of the following points suggests this diagnosis:

1. There was little evidence of renal inefficiency. (*a*) There were no casts in the urine; (*b*) albuminuria disappeared within a week of onset of the illness; (*c*) the blood urea level did not rise above 50 milligrammes *per centum*.

2. Nevertheless, the patient was comatose, had had a convulsive seizure, and complained of severe headache and blurred vision. These cerebral manifestations are paralleled by the height of the blood pressure rather than by the degree of renal inefficiency.

3. The thickened radial arteries are suggestive of vascular disease of long standing.

4. Other possible factors are excluded—lead poisoning by the absence of punctate basophilia, of lead in the urine and of radiographic bone changes, and polycystic renal disease by the good renal function and the lack of palpable abdominal tumour.

The inference drawn from these features is that the condition is primarily vascular rather than renal.

Cases such as this are probably more common than is realized. The diagnosis of acute nephritis is made, and when after apparent recovery the patient is found to have hypertension this is attributed to the nephritis. The actual state is essential hypertension with an encephalopathic crisis; after recovery the blood pressure returns to the pre-critical level.

In acute nephritis the blood pressure rarely exceeds 180 millimetres of mercury (maximum). In hypertensive crises the blood pressure is often higher, and on recovery there is a temporary drop below the pre-critical level (see Figure II).

The pathogenesis of hypertensive encephalopathy, as seen in essential hypertension, acute nephritis and eclampsia, appears to be a generalized temporary arteriolar spasm of unknown cause, resulting in (i) renal anoxia, with albuminuria and a fall in urinary output, and (ii) capillary anoxia, which produces increased permeability of the capillaries and œdema of the loose tissues of the

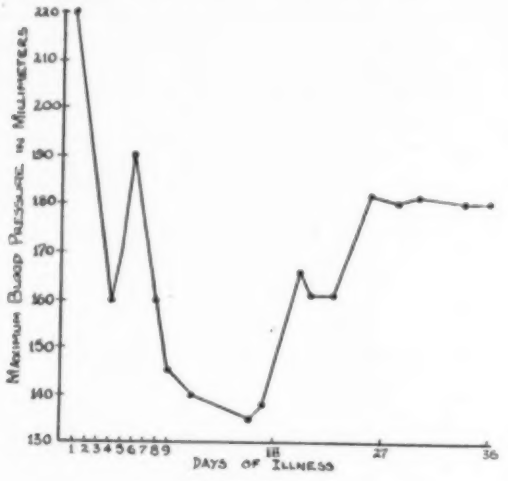

FIGURE II.

body, especially the eyelids and the brain. The cerebral œdema is probably the cause of headache, convulsive seizures and coma.

The difference between the hypertensive encephalopathy of acute nephritis and eclampsia and that of essential hypertension is probably that the former is due to a transient spasm occurring in an otherwise normal vascular system, the ultimate prognosis being good, and the latter to a transient spasm occurring in a vascular system which is already undergoing the progressive pathological changes of arteriosclerosis with hypertension.

Acknowledgement.

I should like to thank Professor C. G. Lambie for his help in the reporting of this case.

Reviews.

CHILDREN AND PLAY THERAPY.

"CHILD TREATMENT AND THE THERAPY OF PLAY", by Lydia Jackson and Kathleen M. Todd, is a clear and interesting exposition of the theory and practice of psychological therapy in its application to emotionally disturbed children.[1] Although play has always been a natural expression of childhood, it is only recently that this spontaneous activity has been developed into a method of exploring the child's mind, and that a therapy of play has emerged as a form of treatment of psychological disorders. In the hands of properly trained specialists the method described should be a valuable addition to those already in use.

Play was first employed as a method of diagnosis and treatment of problem children, because to the child it is a natural means of expression, and as he plays he relives and reveals himself, for play, like everything else in mental life, is influenced by what has gone before it.

In tracing the development of parent-child relationships, the authors are satisfied that the child who is "not wanted" starts life with a definite handicap, and the difficulties arising from mishandling of feeding problems, over-strict toilet training, and unwise handling of temper tantrums have been found among the prime causes of maladjustment a few years later.

Well-chosen case studies describe the play activities of children suffering from various forms of neurosis. Each of the several types of play mentioned serves as an indication of the child's innate disposition on the one hand, and of the character of the conflict from which he suffers on the other.

Work with the parents undertaken by the social worker is of supreme importance, as treatment given by the therapist can so easily be nullified if the parents' attitude is lacking in understanding. The social worker is the liaison between the child's therapist and his parents, and as many of the parents are themselves mentally disturbed it is essential that she should have psychiatric training.

The book would be of interest to parents as well as to medical and lay workers in the psychotherapy of children.

[1] "Child Treatment and the Therapy of Play", by Lydia Jackson, B.Sc. (Oxon.), and Kathleen M. Todd, M.B., D.P.M., with an introduction by Emanuel Miller, M.A., M.R.C.P., D.P.M.; 1946. London: Methuen and Company Limited. 8¼" × 5¼", pp. 125. Price: 8s. 6d.

Notes on Books, Current Journals and New Appliances.

TWO BOOKS OF SHORT STORIES.

Two books of short stories of considerable merit have recently been published by Angus and Robertson, of Sydney. One is by Margaret Trist and the other by Alan Marshall. Unfortunately we can do little more than note their appearance.

"What Else is There?", by Margaret Trist, is divided for convenience into three sections.[1] The first deals with "Grandmother" and life in the country, the second is called "Mountain Town", and the third is "Monday's Washing Day". They are stories about simple things and homely everyday people, but they live; the children, the men and the women whom we meet talk to us so that we know them and understand them. What is more, we like them.

"Tell Us About the Turkey, Jo" is somewhat more robust—there is perhaps a certain striving for effect, though this does not obtrude itself.[2] The first story which gives the book its name and deals with two very small boys is a gem. "Tch, Tch" which deals with a scene in the out-patient department of a hospital will appeal to the medical mind.

Both these books are well worth while and may be recommended as pabulum for odd moments.

AN AUSTRALIAN HISTORICAL NOVEL.

"THE TWIG IS BENT", by Capel Boake, is an historical novel of considerable merit.[3] The scene is set in Melbourne in the 1850's, and the interest centres around the family of John Allister, a well-to-do merchant of liberal and indeed advanced views. The period covers the separation of Victoria from New South Wales and its foundation as an independent colony, the discovery of gold in New South Wales and its repercussions on Victoria, and the gold rush to Ballarat, whose causes and effects are well described. The author has taken pains with the historical background of his story; it is lightly but skilfully sketched, and forms an integral part of the plot. Incidentally, the reader's historical knowledge should benefit by the informed presentation of events, political and economic, which led to the seething unrest on the goldfields that culminated in the tragic Eureka Stockade. The characters in this novel are diverse and alive, and the theme is unusual. Last, but not least, we can appreciate the author's command of the English language.

[1] "What Else is There?", by Margaret Trist; 1946. Sydney, London: Angus and Robertson Limited. 7¼" × 5", pp. 274. Price: 7s. 6d.

[2] "Tell Us about the Turkey, Jo", short stories by Alan Marshall; 1946. Sydney and London: Angus and Robertson Limited. 7¼" × 5", pp. 218. Price: 7s. 6d.

[3] "The Twig is Bent", by Capel Boake; 1946. Sydney and London: Angus and Robertson Limited. 7¼" × 5", pp. 296. Price: 7s. 6d.

The Medical Journal of Australia

SYDNEY, SATURDAY, OCTOBER 26, 1946.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

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PHYSICAL EXAMINATION AND RADIOGRAPHY OF THE CHEST.

The discovery of the stethoscope by René Théophile Hyacinthe Laennec marked an epoch in the history of medicine. Thomas Addison wrote in 1846:[1] "Were I to affirm that Laennec contributed more towards the advancement of the medical art than any other single individual, either of ancient or of modern times, I should probably be advancing a proposition which, in the estimation of many, is neither extravagant nor unjust." Addison suggested that anyone who thought that he spoke with exaggeration and enthusiasm rather than in sober judgement, should try to ascertain the actual state of knowledge. Such a person, he said, would find that Laennec was the original and undisputed author of the alphabet of thoracic disease. Laennec's monumental work, which was entitled "*De l'auscultation médiate, ou traité du diagnostic des maladies des poumons et du coeur, fondé principalement sur ce nouveau moyen d'exploration*", appeared in August, 1819, and little of importance has been added to the subject by any author since. Auscultation, as every practitioner knows, is an art not too easily mastered, but the information that can be gained by its means is often invaluable. Until the advent of X rays and their application to the diagnosis of diseases of the chest physical examination was the method on which the clinician relied to discover abnormal conditions in the thorax. Nowadays the combined use of physical and radiological methods of examination is necessary. Each of these methods is supplementary to the other, but both are not always available—a modern X-ray unit that will produce satisfactory skiagrams of the chest is not always at the practitioner's elbow. A discussion on the place that each method should take in clinical examinations would be expected to prove useful. Such a discussion has recently taken place at the Royal Society of Medicine, London.[2]

It was perhaps unfortunate that the discussion was stated to deal with the stethoscope *versus* X rays. The title, however, arrests the attention. As a matter of fact the views expressed by the several speakers did not suggest that one method should be substituted for the other. James Maxwell, who spoke first, pointed out that at present the main emphasis in student teaching lay on physical examination, but that the use of X rays had greatly increased the accuracy of diagnosis. X rays, he declared, were essential in the recognition of all respiratory conditions. He implied that doctors did not recognize this fact, for he stated that most doctors were apt to assume, and, even worse, to announce to their patients that the failure to detect physical signs implied a healthy respiratory tract. This is a sweeping statement. We should not like to think that it applied to the majority of Australian practitioners. Be that as it may, the indispensability of X-ray examination is the first point to be remembered in a discussion on this subject. As a matter of fact Maxwell drew attention to the legal aspect. He thinks that failure to advise an X-ray examination of the chest may in certain circumstances be looked on as evidence of neglect, that nowadays it would not be a good defence merely to show that a full and careful physical examination had been carried out. Serious consideration should be given to this possibility. In regard to the X-ray examination of the chest, attention must be directed to the inadequacy of the standard postero-anterior film. Maxwell pointed out that quite large lesions may sometimes fail to appear if they are situated far to the front or the back. Further, a small lesion may be obscured by a rib or the clavicle and a large area of the lung field is hidden behind the heart and below the dome of the diaphragm. In these circumstances it is readily understood that early tuberculosis and early malignant disease may easily be missed. Multiple skiagrams, including postero-anterior, antero-posterior and lateral views, yield far more information than can be obtained with one film only. Sometimes a bronchogram or a tomogram will yield more evidence than can be obtained on a plain film. Peter Kerley maintained that tomography was not used nearly enough. He believes that radiology of the chest is still in its early stages and that in the near future we may regard our present standards as obsolete and our pictures as crude images. With Kerley's further remarks on newer methods and apparatus we need not concern ourselves, but we should realize that technical progress can be, and is being, made. In regard to tuition of the student, Maxwell remarked that if chest radiology was entirely reliable there would be something to be said for abandoning the teaching of physical signs. His reason for the teaching of physical signs is that there is a small but definite percentage of error, even in well-taken films. This is all very well, but such a view presupposes that every medical practitioner will always have at his elbow an X-ray plant as efficient as the stethoscope that he carries in his pocket. We may be quite certain that such Utopian conditions do not exist even in London. Even if they did exist in London and in every part of the Commonwealth of Australia, he would be a bold teacher, and a foolish one, who advocated the deletion

[1] Quoted by G. B. Webb in "René Théophile Hyacinthe Laennec: A Memoir", 1928.

[2] *Proceedings of the Royal Society of Medicine*, May, 1946.

of training in physical methods of examination of the chest which if it does nothing else, sharpens a student's powers of observation and adds to his ability to handle a patient. That, as Maxwell declared, the clinician who is familiar with the physical condition of the patient is in the best position to interpret X-ray films of the chest, most of us will agree. But—and the "but" is important—he must be trained in this work. The accuracy in the interpretations of some trained radiologists is often almost uncanny, and if he will give the time to the study, the clinician can become equally accomplished. Failing this concentrated study by the clinician, there should be more consultations between the radiologist and the clinician. The radiologist is not, and never wants to be regarded as, a so-much-in-the-slot machine—"pay your fee and get your diagnosis in a polite letter with the film next day". Lack of consultation is more often than not the fault of the physician. This would not be so common if Maxwell's idea was adopted that students should be taught the interpretation of skiagrams at an early stage in their career. A start, he thinks, should be made with normal films in the departments of physiology and anatomy; normal bronchograms would give a clear conception of the bronchial tree as it functions during life. This would be a useful basis for the study of abnormal appearances at a later stage of medical education, and it would create a useful attitude of mind in the student.

We have seen that radiological examination is essential in the thorough investigation of the condition of a patient's chest. We recognize that physical examination also is necessary. There is really no reason why the relative value of these methods should be stated. But as L. G. Blair at the London discussion made a pronouncement, the matter should be mentioned. Blair, after setting out all that X-ray methods can determine, pointed out that the group of conditions in which physical signs might be of paramount importance was relatively very small. He therefore suggested that in the investigation of chest disease the present order of examination should be retained, namely, the taking of the history, the physical examination and the X-ray examination. He wishes to insist, however, that in the diagnosis and treatment of chest conditions the history is of supreme importance, radiology comes next, and physical signs are often only an aid to the correct interpretation of the shadows present on the X-ray film. If the clinician is to cultivate his powers of observation to the utmost possible degree he should rather look on the X-ray findings as ancillary to his own personal observations. This is a necessary attitude in an age in which tests of all kinds—in the laboratory and in the X-ray room—are so readily obtained.

A final word remains. Training in the interpretation of X-ray films and the improvement of X-ray apparatus have been mentioned. Training in physical methods is needed and specially in the recognition of abnormal sounds with the stethoscope. Here modern science comes to our aid. In this issue reference is made in two articles by Dr. E. H. Stokes and Mr. V. M. Brooker to a series of gramophone records of heart sounds and respiratory sounds. These are a fine achievement of clinical research and technical recording. They are likely to prove of great value to both undergraduate and post-graduate students of medicine.

Current Comment.

VISTAS IN ANTIGEN RESEARCH.

When in 1923-1924 M. Heidelberger and O. T. Avery proved beyond the possibility of doubt that the immunological specificities of various types of pneumococcus resided in their polysaccharide capsules, a decided shock was administered to those who held that nothing less complicated than the protein molecule could enter into any antigenic activity.[1] A building erected by the use of one form of brick may display a certain diversity, but this is nothing in comparison with the enormous range of styles and patterns when there are twenty-two completely separate varieties of brick. The old conception that only a protein can act as an antigen has, however, been proved to be correct, and this holds for combinations of protein with non-protein groups; yet the doctrine of the dependence of specificity of the pneumococcus upon a polysaccharide has not been disproved, but rather confirmed. It was soon found that the pneumococcus has another lesson to impart. One form is fully encapsulated with a smooth surface; another, the "rough" form, is devoid of a capsule. Both forms under favourable conditions of growth keep true to type; but it was discovered that the "rough" uncapsulated variety could be changed into the smooth by the action of nucleic acid, though this apparently remained uncombined with the polysaccharide investment.[2]

As far back as 1917 J. Loeb put forward the speculation that the protein differences between species as disclosed in immunology could be explained on Mendelian lines.[3] This guess, if guess it was, time has shown to be correct; the antigens of the blood cells of man are indeed gene-controlled. As is well known, the practice of blood transfusion has led to one discovery after another concerning the antigens in corpuscles and the antibodies in the plasma. The use of blood-grouping in anthropology and in restricted cases of disputed paternity depends on the gene or hereditable basis of the different types which are individually found. The discovery by Landsteiner and Wiener in 1940-1941 of the cellular antigen named Rh was not only of importance in the technique of blood transfusion, but acquired a new significance in obstetrics. When, as is now generally recognized, the Rh factor is present in the fœtus but absent in the mother, the mother may develop immunity against the fœtal cells producing the dreaded condition *erythroblastosis fœtalis*.

The A and B antigens were first detected in human red cells, but have since been found in most other cells and tissue fluids as might be expected from their gene connexion—a matter of importance in surgical tissue grafting. M and N are, however, difficult to demonstrate in cells other than blood. If the experiments of K. E. Boorman and B. E. Dodd were correctly carried out the Rh factor may also be discoverable elsewhere than in erythrocytes and should be taken into account in tissue grafting.[4] For a cell antigen to appear in secretions, such as saliva, apparently another gene is required, and further, there is a chemical difference, for salivary A and B are water-soluble, whereas those in erythrocytes and body cells are alcohol-soluble.

As might be expected, research has been active on the higher apes and A and B, or antigens exceedingly akin, have been found here. Also experiments have been carried out on birds; particularly pigeons and doves, which give viable hybrids, and these have confirmed the conclusion that the antigens are the direct products of genes. Of particular interest is the finding that the Forssman antigen, similar to A in man and so far not proved to be

[1] *The Journal of Experimental Medicine*, Volume XL, 1924, page 301.
[2] *Ibidem*, Volume LXXIX, 1944, page 137.
[3] *Science*, Volume XLV, 1917, page 191.
[4] *The Journal of Pathology and Bacteriology*, Volume LV, 1943, page 329.

gene produced, is present in some plants.[1] Most important of all from the standpoint of general biology is the question whether a gene can combine with an antibody and be mutationally altered; certain preliminary experiments indeed hint that it can;[2] if this is the case and the germ plasm can be changed by antibodies, a new and startling chapter in the science of heredity is foreshadowed.

TOTAL PANCREATECTOMY.

THE removal of the pancreas is a procedure which not so long ago would have been thought hardly compatible with survival. Not only is it a difficult and hazardous operation, but results of loss of the pancreatic secretions are far-reaching and serious. A case of successful pancreatectomy is described by C. F. Dixon, M. W. Comfort, A. L. Lichtman and R. F. Benan.[3] Their patient was a man, aged fifty years, who was a diabetic and had suffered from coma some nine months before coming under surgical treatment. Under a régime which included the use of protamine zinc insulin he maintained fair health for some time, until he suffered from a febrile illness which was followed by jaundice. Hæmatemesis then occurred, necessitating several transfusions of blood. He was submitted to laparotomy and cholecysto-jejunostomy was performed. During the operation the pancreas was noticed to be large and œdematous. His jaundice cleared, but after initial improvement his condition deteriorated and severe vomiting occurred. Investigation was then carried out in the Mayo Clinic, which revealed an obstructive lesion of the duodenum in the region of the ampulla of Vater. At operation a large tumour of the head and body of the pancreas was found, encircling and obstructing the second part of the duodenum. No metastases were found on careful abdominal survey, so excision of the involved parts was undertaken. The spleen was removed and this afforded better exposure and lessened bleeding. Difficulty was found with the previous anastomosis that had been made, but after a very difficult dissection over the portal vein and the superior mesenteric vessels the stomach was transected at its distal third and the duodenum divided at the level of the ligament of Treitz, and these portions of the alimentary canal together with the entire pancreas were removed. A gastro-jejunostomy was performed and this completed an operation that lasted over three and a half hours. A total of 2,500 millilitres of blood was given by transfusion during and after the procedure, which was very well tolerated. The patient made a good recovery and during his convalescence a series of metabolic studies was carried out to ascertain how the bodily economy had adjusted itself to this drastic treatment.

The dose of insulin was perforce increased, a daily dose of 40 units of protamine zinc insulin being required. Insulin was deliberately withheld during two intervals, with the patient's cooperation, in order to study the development of ketosis. Basal conditions for the patient were secured both before and after these trial periods, each of which lasted for eighty-nine hours. Full observations of the blood chemistry were made, and these included determinations of the hepatic function and the blood lipids. It was found that the patient showed considerably reduced ability to digest and absorb fat and protein, about one-half and one-third respectively being lost in the fæces. This loss was diminished considerably by the administration of pancreatin in daily doses of 15 grammes. Briefly summarized, the results of the investigations showed that this man, when deprived of insulin, showed pronounced ketonæmia when 125 grammes of carbohydrate were given, but only a slight degree when the amount was increased to 440 grammes. Total pancreatectomy did not produce diarrhœa, in spite of the large amount of fat in the stools, and though pancreatin improved the nutrition of the patient and lessened the degree of deficient absorption, it did not completely replace the natural external pancreatic secretion. No indication was given of hepatic dysfunction indicative of a fatty liver, such as is observed in laboratory animals, and the glucose lost in the urine was not decreased.

This patient has been able to return to work with his diabetes still well controlled, and twelve months after the operation remains well. It is hard to know which to admire more, the skill and care which enabled the patient to make so excellent a recovery from an exceedingly dangerous and radical operation or the remarkable powers of adaptation of the human body to the loss of an organ with such important internal and external secretions.

[1] W. C. Boyd: "Fundamentals of Immunology"; 1943.
[2] *Biological Reviews*, Volume XXI, 1946, page 93.
[3] *Archives of Surgery*, June, 1946.

A PAPAL ADDRESS TO DOCTORS.

EARLY last year a medical conference of Allied service medical specialists was held in Rome and the doctors who attended it were received by Pope Pius XII, who addressed them. The address has been reported *verbatim* by E. R. Cullinan, who was present as a guest, and who states that the Pope's words, in faultless English, made a deep impression on all his hearers.[1]

The Pope first recalled the parable of the Good Samaritan (with striking fitness preserved for posterity in the gospel written by Saint Luke, himself a doctor) as illustrating the spirit of prompt and unselfish devotion that had characterized the profession of medicine throughout human history. Alas for mankind if it had not! The doctor was not handling inert matter, however priceless, the Pope continued. His patient was a human creature like himself, with a mission to fulfil, even though humble, in human society. And, moreover, he had a rendezvous with eternity.

"Precious creature of God's love and omnipotence! Spirit and dust compounded to form an image of the Infinite, living in time and space, yet headed towards a goal that lies beyond both! Part of the created universe, yet destined to share the glory and joy of the Creator, that man who places himself in the care of a doctor is something more than nerves and tissues, blood and organs. And though a doctor is called in directly to heal the body, he must often give advice, make decisions, formulate principles that affect the spirit of man and his eternal destiny. It is after all the man who is to be treated, a man made up of soul and body, who has temporal interests but also eternal; and as his temporal interests and responsibility to family and society may not be sacrificed to fitful fancies or desperate desires of passion, so his eternal interests and responsibility to God may never be subordinated to any temporal advantage . . . It is clear, then, . . . how the medical profession places its representatives squarely within the orbit of the moral order, to be governed in their activity by its laws. Whether it be a question of teaching or giving advice or prescribing a cure or applying a remedy, the doctor may not step outside the frontier of morality, dissociating himself from the principles of ethics and religion. His vocation is noble, sublime, his responsibility to society is grave; but God will not fail to bless him for his charity and for his unstinting devoted efforts to alleviate the sufferings of his fellow man on earth . . . It is our most earnest prayer that this blessing may be granted to you all abundantly from the loving bounty of God."

We agree with Cullinan that the Pope's words are particularly apposite at the present time. The advances in scientific medicine have tended at times to turn sick people into so many medical and surgical cases or even series of cases. The growth of social medicine has led to some legislative activity and much planning for the future, but not always with as lively a regard for the things which fortify the spirit as for those which comfort the body. As the Pope has said: "It is after all the man who is to be treated."

[1] *Saint Bartholomew's Hospital Journal*, April, 1946.

Abstracts from Medical Literature.

THERAPEUTICS.

Aminothiazole in Thyreotoxicosis.

M. PERRAULT AND D. BOVET (*The Lancet*, May 18, 1946), following the observation that goitre developed in workers employed in the extraction of aminothiazole, which is used in industry in large quantities for the preparation of sulphathiazole, administered this substance to 129 persons, 71 of whom were suffering from thyreotoxicosis. It was thought to be less toxic than thiouracil and it controlled thyreotoxicosis in the same way.

Influenza B.

T. FRANCIS, J. E. SALK AND W. M. BRAKE (*The Journal of the American Medical Association*, May 25, 1946) have discussed the protective effect of vaccination against epidemic influenza B. The type of epidemic of influenza B varies. In America observation of common respiratory infections in different service commands is maintained, and investigation for influenza strains is regularly carried out. Scattered outbreaks of influenza B were observed from March to November, 1945, in the United States of America, the Pacific Ocean area, Alaska and the Antilles. The type varied from mild subclinical to typical three or four day febrile attacks, in some cases with pulmonary involvement. These widespread outbreaks culminated in a sharp civilian epidemic in the United States of America. At the University of Michigan there were 600 soldiers who had been vaccinated with combined concentrated influenza A and B vaccine prepared from infected allantoic fluid. There were also 1,100 unvaccinated men. Investigation of throat washings during October to December showed that 109 of the unvaccinated men and seven of the vaccinated men suffered from acute respiratory disease of the influenza B type. In other words, 99 per thousand of the unvaccinated and 11 per thousand of the vaccinated men suffered from influenza B. The evidence clearly indicates that vaccination subcutaneously with inactivated virus types A and B exerted a striking protective effect against epidemic influenza B.

Ulcerative Colitis Treated with Intestinal Mucosa.

A. MORTON GILL (*Proceedings of the Royal Society of Medicine*, July, 1946), thinking that ulcerative colitis with its tendency to spontaneous remissions and relapses might in some cases be the result of a deficiency, tried the administration of raw small intestine. The first patient was a man who had failed to respond to orthodox therapy, and who had for a long time had no remission. Treatment with raw pig's small intestine by mouth produced a remission which was maintained for so long as he took the preparation. When supplies failed he had a relapse. Two types of dried preparations of pig's small intestinal mucosa then became available, one in which enzymal activity was retained (A) and one other (B). Preparation A produced little or no improvement; preparation B produced a complete remission within a month. In a small series of other cases similar results were obtained. The author makes the following points: (i) The term "ulcerative colitis" covers more than one disease; alternatively, the ætiology of all cases of ulcerative colitis is not the same. (ii) In one group of cases the cause may lie in some deficiency caused by a lack of some factor produced by the small intestine; treatment with intestinal mucosa in some cases has given promising results. (iii) To increase the dose of dried mucosa beyond one ounce per day does not improve results; a small dose (for example, one drachm per day) is without effect. There is always a latent period of about three weeks before any appreciable improvement is noted. (iv) Mucosa from the different anatomical segments of the small intestine appears effective; possibly the effect of jejunal mucosa is the most lasting. (v) A new, highly concentrated preparation is on trial, of which one drachm is equivalent to one ounce of preparation B. (vi) The mode of action of this form of therapy is still unproven.

Kemithal: A New Intravenous Anæsthetic.

R. R. MACINTOSH AND R. D. SCOTT (*The Lancet*, May 25, 1946), who have administered kemithal (5-cyclohexenyl-5-allyl-2-thiobarbituric acid) by intravenous injection as an anæsthetic agent to 400 patients, report that its actions closely resemble those of soluble thiopentone ("Pentothal Sodium"). In ten cases kemithal was given rectally and proved to be a satisfactory basal anæsthetic; to a healthy adult three milligrammes in about 50 or 60 millilitres of water were given about forty-five minutes before the operation.

J. HALTON (*ibidem*) reports the use of kemithal as the main anæsthetic in over 300 major thoracic operations with very satisfactory results.

Scrub Typhus.

N. A. TIERNEY (*The Journal of the American Medical Association*, May 25, 1946) has described the effect of treating tsutsugamushi disease with para-aminobenzoic acid. In two military hospitals at Ledo in Assam, in the vicinity of the jungle where infected mites abound, alternate patients with scrub typhus were given six to eight grammes of para-aminobenzoic acid, followed by three grammes every two hours until the temperature had been normal for a week. Ten millilitres of 5% sodium bicarbonate solution were mixed with each gramme of para-aminobenzoic acid powder. Full supporting treatment was given in all cases. The results were that the treated patients had fewer days of fever, less severe symptoms, fewer complications, shorter convalescence and a lower fatality rate. Para-aminobenzoic acid given in the first week is effective against tsutsugamushi disease. It may be effective against other rickettsial diseases.

Poliomyelitis.

M. J. FOX (*The Journal of the American Medical Association*, May 25, 1946) has described an investigation into the effect of curare in acute poliomyelitis. Thirty-four patients were given intramuscular injections of 0·9 milligramme of curare per kilogram of body weight as soon as possible after the diagnosis of poliomyelitis was made. Patients with the spinal type of paralysis in some cases were reported to show some relaxation of muscle spasm within an hour of the injection, but even this beneficial effect was doubtful, and was not persistent. In bulbar and spinal bulbar paralysis there was no improvement following the injection, and in two cases the symptoms became rapidly worse. Repeated small doses of curare were tried in two cases, but without benefit. The author concludes that in some instances curare may be of temporary benefit, but that it is a dangerous drug and its use is not to be encouraged in the treatment of the acute phase of poliomyelitis.

Efficacy of Penicillin Ointments.

J. A. HEINLEIN, C. C. CARPENTER, A. YAGUDA AND JEAN C. WYSE (*United States Naval Medical Bulletin*, August, 1946) have sought a suitable ointment base for penicillin, in order to assure even dispersal of the penicillin in the mixture as well as diffusibility to all parts of the lesion. The choice seemed to lie between a lanolin-containing ointment and an oil-water emulsion base. The authors investigated the problem with 400 units of penicillin per gramme in both types of base. They found that penicillin incorporated in an oil-water emulsion base was more rapidly efficacious than when used in a lanolin base. They also found that the bactericidal activity of penicillin deteriorated within two weeks in both types of ointment if the ointment was stored at room temperature. The penicillin in the lanolin base still had some antiseptic effect after six weeks when stored in the refrigerator.

Penicillin in Putrid Lung Abscess.

B. P. STIVELMAN AND J. KAVEE (*Annals of Internal Medicine*, July, 1946) discuss the treatment of putrid lung abscess. They point out that opinion is divided on the question whether such abscesses should be treated medically or surgically. In the past few decades many cures have been reported from various chemicals, vaccines and bacteriophage. Even artificial pneumothorax, obviously contraindicated in such a condition, was praised by some workers. The authors have treated six patients suffering from acute putrid lung abscess with penicillin and sulphadiazine; five of the patients recovered completely. This result suggests that this method of treatment deserves serious consideration and further trial, especially since four of the patients belonged to a group which would previously have been held to require immediate surgical interference; one of them would probably not have survived operation. The position is different with regard to chronic lung abscess; the lung and bronchi have been converted to a maze of fibrosis, multiple hard-walled abscesses, bronchiectasis, atelectasis and chronic pneumonitis, so that neither medical care nor extensive surgical measures can be expected to restore the condition to normal. Sometimes lobectomy or pneumonectomy alone will save the patient's life. Yet even in these circumstances combined penicillin and sulphadiazine treatment is of great value. It reduces toxicity, prevents the formation of more septic

and metastatic foci, clears away the surrounding pneumonitis, and improves the patient's general condition so that he is better able to bear the necessary extensive operation. The authors emphasize the need to continue the combined treatment in acute putrid lung abscess, not only until all toxic and local symptoms have disappeared, but until X-ray examination reveals no abnormal shadows in the involved segment of lung. In the treatment of chronic putrid lung abscess, the combined penicillin and sulphadiazine treatment should begin before operation and continue after operation until all toxic symptoms disappear.

NEUROLOGY AND PSYCHIATRY.

Electrical Convulsion Therapy in 500 Selected Psychotics.

F. F. KINO AND F. T. THORPE (*The Journal of Mental Science*, January, 1946) analyse their therapeutic results in the electro-convulsive treatment of five hundred selected cases of melancholia, mania and schizophrenia. In a group of three hundred female melancholic patients 80% were considered to have recovered, while the condition of 15% was improved. In not more than 50% could mania be produced. Schizophrenic patients were disappointing; and in this analysis only 24% were considered to manifest an improved condition. Skeletal complications occurred in eleven instances among about 1,000 patients, and eight of these complications have been compression fractures of the dorsal vertebræ.

Paramyoclonus Multiplex of Friedreich.

E. F. WALKER AND W. E. CHANEY (*The Journal of Nervous and Mental Disease*, March, 1946), having reviewed the literature on *paramyoclonus multiplex* from Friedreich's first contribution in 1881 until the present day, present the case of a twenty-two year old male whose symptoms commenced following a fall in 1942. Routine clinical and biochemical examination revealed no abnormality. In a similar case recently published by Hassin and Kepner the patient showed no abnormality on muscle biopsy. The present authors are driven to the conclusion that the ætiology of the illness remains obscure. Treatment by galvanic stimulation of the muscles and by large doses (fifteen grammes three times a day) of quinine sulphate produced no change in the symptoms. Nor has the patient developed any deteriorating mental symptoms.

Narcotherapy.

PAUL HOCH (*Psychosomatic Medicine*, March-April, 1946) discusses the intravenous use of "Sodium Amytal" in conjunction with psychotherapy in cases of war neurosis. He considers the patient easier to deal with when relaxed under the drug; inhibitions are lowered and the ability to speak is fostered. The establishment of a transference is expedited. Focal points of the neurosis reveal themselves more quietly. From the therapeutic aspect "Sodium Amytal" first produces euphoria, then it breaks down the inhibitory mechanisms. The drug puts the patient in a suggestible frame of mind. The treatment usually makes a strong appeal to the patient. It is superior to hypnotism, which often fails with the over-anxious type of patient. The patient under "Sodium Amytal" gains greater insight, owing to the exploratory procedure, than is the case with hypnosis. Alcoholics and drug addicts are not suitable for this type of treatment.

Intracranial Aneurysm and Polycystic Kidney.

M. J. MADONICK, N. SAVITSKY AND L. HOCHFELD (*The Journal of Nervous and Mental Disease*, May, 1946), by adding two further cases to the twelve already described in the literature, draw attention to the association of intracranial aneurysm and polycystic kidney. They believe this association is more than coincidental. Their cases are presented in detail, the first patient being a fifty-two year old man with a proved congenital aneurysm in the wall of the anterior cerebral artery associated with cysts of the lungs, liver and kidneys. Their second patient is a young man with evidence of two attacks of subarachnoid hæmorrhage and a polycystic kidney, in the authors' view, justifying the hypothesis of the existence of a congenital defect, perhaps an aneurysm, in one of the intracranial vessels.

Ruptured Intervertebral Disk.

JOSEPH S. BARR AND WINCHELL M. CRAIG (*The Journal of Nervous and Mental Disease*, June, 1946) commence by discussing the anatomy and pathology of ruptured intervertebral disk; they quote in detail two typical cases; and they discuss the symptoms, the differential diagnosis and the treatment. They believe that malingering is less frequent in medico-legal cases than conscious exaggeration of symptoms, and more easily detected. The malingerer is likely to trip himself up by inconsistencies in his symptoms and by physical findings which betray the true condition. From a medico-legal standpoint the actual rupture of an intervertebral disk is of consequence only when it produces pain and disability. The majority of patients require operative treatment which in the majority of cases proves successful. When there is any post-operative disablement, it is usually pain. This complicates any case in which litigation may occur. Pain cannot be measured. It cannot be properly estimated; and pain thresholds vary with individuals. A ruptured intervertebral disk may produce a complicated psychosomatic problem when psychiatry begins and surgery finishes.

Psychological Aspects of Psoriasis.

IN a review of 86 patients in the armed forces suffering from psoriasis, E. Wittkower (*The Lancet*, April 20, 1946) identifies five prevailing personality types. These he describes as: (*a*) compulsive, (*b*) over-aggressive and unaggressive, (*c*) bisexual, (*d*) phobic, and (*e*) hysterical. He quotes certain case histories in illustration of these types. He found that psoriasis is not bound to any one personality type. Twenty-nine of his patients were regarded as well adjusted and 43 as maladjusted—a number much greater than would be found in a cross-section of the populace. There was no uniformity of emotional conflicts. Heredity factors played a decided part in some cases, whereas in others a catalyst seemed to be needed to mobilize a dormant predisposition to psoriasis. Emotional crisis seems specific to certain patients; and although in some persons the emotional maladjustment may seem unrelated to the psoriasis, it may nevertheless take charge of the onset of the disease, its remissions and its relapses.

Prognosis in So-Called Sciatic Neuritis.

HENRY S. DUNNING (*Archives of Neurology and Psychiatry*, June, 1946) claims that the common neurological disease called sciatic neuritis is caused in the majority of cases by herniation of the *nucleus pulposus* in a lower lumbar intervertebral disk. This is likely to cause pain from pressure on the nerve roots of the *cauda equina*. He considers the conservative and the surgical treatment of this condition, and finds that the prognosis was satisfactory without spinal operation in 54% of cases. In the series of cases under review surgical removal of the herniated nucleus promptly relieved the pain and bettered the previous prognosis by 32%. In spite of this, however, the author is of opinion that natural processes should be given a chance to repair the defect before surgery is undertaken. Finally he is of opinion that neither neurological signs nor the protein content of the spinal fluid are of any prognostic value.

Arteriographic Visualization of Cerebro-Vascular Lesions.

IN carrying out their arteriographic studies, Sidney R. Govons and Francis C. Grant (*Archives of Neurology and Psychiatry*, June, 1946) have used the essential elements of the technique first described by Egas Moniz. A small collar incision was made in the neck and the common carotid artery was exposed after suitable sedative medication and local procaine anæsthesia. Then ten to fifteen millilitres of a colloidal suspension of thorium dioxide were rapidly injected through a 17 or 18 gauge needle. The first radiological exposure to display the arteries was made when ten millilitres had entered the circulation. The second exposure, five seconds later, showed the venous return. No undesirable reactions were observed from the injection of thorium dioxide. Patients were admitted to hospital for one day and then allowed to go home. The authors consider that cerebral angiography is an important addition to the neurologist's armamentarium. Though Moniz originally introduced this technique for the localization of cerebral neoplasms, the authors consider that the present air insufflation method remains the procedure of choice. They believe, however, that intracranial aneurysms, angiomatous malformations of the brain, occlusions of the internal carotid artery and traumatic arterio-venous aneurysms, may be accurately visualized by cerebral angiography. Twelve neurological cases are quoted with appropriate radiological pictures. The authors further believe that certain puzzling neurological pictures in cases in which air studies are not conclusive may at times be clarified by cerebral angiography, and they claim that in cases of spontaneous subarachnoid hæmorrhage the use of this technique should be seriously considered.

Bibliography of Scientific and Industrial Reports.[1]

THE RESULTS OF WAR-TIME RESEARCH.

During the war a great deal of research was carried out under the auspices of the Allied Governments. It has been decided to release for general use a large proportion of the results of this research, together with information taken with former enemy countries as a form of reparations. With this end in view, the United States Department of Commerce, through its Publication Board, is making a weekly issue of abstracts of reports in the form of a "Bibliography of Scientific and Industrial Reports". This bibliography is now being received in Australia, and relevant extracts are reproduced hereunder.

Copies of the original reports may be obtained in two ways: (a) Microfilm or photostat copies may be purchased from the United States through the Council for Scientific and Industrial Research Information Service. Those desiring to avail themselves of this service should send the Australian equivalent of the net quoted United States price to the Council for Scientific and Industrial Research Information Service, 425, St. Kilda Road, Melbourne, S.C.2, and quote the PB number, author's name, and the subject of the abstract. All other charges will be borne by the Council for Scientific and Industrial Research. (b) Those marked with an asterisk may be obtained by approved applicants without cost on making application to the Secondary Industries Division of the Ministry of Post-War Reconstruction, Wentworth House, 203, Collins Street, Melbourne, C.1. Copies of these are available for reference in public libraries.

Further information on subjects covered in the reports and kindred subjects may be obtained by approaching the Council for Scientific and Industrial Research Information Service, the Secondary Industries Division of the Ministry of Post-War Reconstruction, or the Munitions Supply Laboratories (Technical Information Section), Maribyrnong, Victoria.

Pavcek, P. L. *Institut für Luftfahrt Medizin*, Hamburg. Off. Pub. Bd., Report, PB 3429. 1945. 1 p. Price: Microfilm, 50c.; Photostat, $1.00.

Interview with Dr. Schwartz, of the Medical School Faculty, who stated that the institute was started in 1940 by order of the *Luftwaffe*, its work being secret. In January, 1945, it was moved to Berlin, and after the capitulation the British moved the equipment to England. Its work was pure physiological research dealing with aviation medicine and involved high altitude oxygen tolerance tests.

Pavcek, P. L. *Kaiser Wilhelm Institut*, Heidelberg. Off. Pub. Bd., Report, PB 3425. 1945. 2 pp. Price: Microfilm, 50c.; Photostat, $1.00.

Interview with Dr. Richard Kuhn, director, regarding his knowledge of recent activity in biological chemistry. Most of Dr. Kuhn's work was on various benzil derivatives, the most potent being "3065", the structural formula of which is given. "3065" was said to be effective on the influenza virus and in treating typhus. His work on penicillin concerned only the isolation of a yellow pigment from *Penicillium rosca citricum* Dirk, a mould responsible for the bactericidal activity of "Fissan", a baby dusting powder. He also established the destructive action of nitrogen trichloride on vitamin *E*, and upon his recommendation its use in bleaching wheat was discontinued. He told of work in conjunction with Dr. Grafe in Wurtzberg on the treatment of jaundice by using one gramme doses of tocopherol intramuscularly over a three to seven day period.

Alexander, Leo. German military neuropsychiatry and neurosurgery. Off. Pub. Bd., Report, PB 4286. No date. 140 pp. Price: Microfilm, $1.50; Photostat, $10.00.

This detailed report is made up from information obtained from the leading psychiatrists and neuropsychiatrists in the German Army Medical Corps, heads of clinics in medical schools, university professors and neurosurgeons. It includes sections on: (*a*) neuropsychiatry in the German Army; (*b*) neuropsychiatry in the German Air Force; (*c*) the precarious state of psychotherapy and psychotherapeutic training in Germany before the war, as expressed in confidential reports by Professor Kretschmer and Professor Mauz; (*d*) neurosurgery in the German Army and German Air Force; (*e*) general conclusions. Appended are a list of regulations, memoranda, circular letters and reports governing neuropsychiatric practice in the German Army, and lists of published and unpublished articles.

Alexander, Leo. Public mental health practices in Germany: Sterilization and execution of patients suffering from nervous or mental disease. Off. Pub. Bd., Report, PB 4283. 1945. 176 pp. Price: Microfilm, $2.00; Photostat, $12.00.

This report is compiled from information received from directors, doctors and nurses connected with State hospitals for the insane and for mental and nervous diseases and from professors of psychiatry and neuropsychiatry. Lists of personnel implicated in these practices are given. There are 119 pages of documents in German which may not reproduce well. Some of these documents are translated in the first part of the report.

Duke-Elder, Sir Stewart, *et alii*. Investigation of certain German medical schools. Off. Pub. Bd., Report, PB 4331. 1945. 111 pp. Price: Microfilm, $1.50; Photostat, $8.00.

The subject headings of this report are: 1. Ophthalmology, by Brigadier Sir Stewart Duke-Elder. 2. Ear, Nose and Throat, by Brigadier D. W. Daggett. 3. Medical Education, Internal Medicine and Pædiatrics, by Captain R. C. Eley and Lieutenant-Colonel E. L. Persons. 4. Surgery, by Major W. L. Butsch. 5. Summary. 6. List of reprints. The following institutions were visited: Universities of Heidelberg, Freiberg, Tübingen, Erlangen and Innsbruck; Brain Research Institute, Neustadt, Black Forest; Sports Hospital, Rehabilitation Hospital and Dr. Henschke's Research Laboratory, Garmisch-Partenkirchen; Stradkrankenhaus, Furth.

McCarthy, Charles L. Medical faculty of the Friedrich-Schiller-University, Jena. Off. Pub. Bd., Report, PB 4284. 1945. 40 pp. Price: Microfilm, 50c.; Photostat, $3.00.

This university has always been held in great esteem. Public opinion was so strong that the Nazis were afraid to discharge the older professors and appoint ardent Nazis in their places. The medical school buildings were about 25% destroyed by bombings. The best known men on this faculty were the Dean, Professor Wolfgang H. Veil, head of the department of internal medicine and neurology, Professor Hans Schlossberger, director of the Institute of Hygiene and Bacteriology, Professor von Mikulicz-Radecky, head of the department of gynæcology and obstetrics, and Professor J. Zange, head of the ear, nose and throat department. A summary of the research work of the various departments is given, with lists of publications and abstracts of important papers published by members of the departments. These include papers on Graves's disease; the pathology of the brain stem; the Röntgen treatment of carcinoma of the larynx; metastasis of malignant blastomas of the throat, nose and ear; frontal sinus punctures; histological evaluation of the colposcopic picture; and a number of other topics. No evidence of any research work being done to further the war effort was found by this investigator.

Schulte, Walter. Effect of unaccustomed lack of sleep on development of epileptic and syncopal attacks. Off. Pub. Bd., Report, PB 1139. 1944. 3 pp. Price: Microfilm, 50c.; Photostat, $1.00.

An abstract in English of an article from *Münchener medizinische Wochenschrift*, 91: 1-5, January 14, 1944. Study considers unusual sleep deprivations such as are experienced by men in army service. Such periods of lack of sleep favour, and under certain circumstances, will provoke epileptic seizures, though the lack of sleep itself is not the only or the most important factor involved. This abstract was issued by the Interdepartmental Committee for the Acquisition of Foreign Publications.

Duke-Elder, Sir Stewart, *et alii*. Investigation of certain German medical schools. Off. Pub. Bd., Report, PB 6666. 1945. 111 pp. Price: Microfilm, $1.50; Photostat, $8.00.

Institutions visited: Universities of Heidelberg, Freiberg, Tübingen, Erlangen and Innsbruck; Brain Research Institute, Newstadt, Black Forest; Sports Hospital, Rehabilitation Hospital and Dr. Henschke's Research Laboratory, Garmisch-Partenkirchen; Stadtkrankenhaus, Furth. Fields studied: ophthalmology; ear, nose and throat; medical education, internal medicine, pædiatrics and surgery. In general it can be said that German medicine and medical schools are so far behind the times that several years of reorientation and reorganization of teaching plans will be necessary if the German physician of the future is to be equipped to secure and maintain a level of health in the population, which will protect the people who live in geographic proximity.

Various Medical Articles. Off. Pub. Bd., Report, PB 1688. 1939-1945. 1709 pp. Price: Microfilm, $17.50; Enlargement Print, $114.00.

This report consists of a microfilm reel containing published and unpublished papers and reports of J. Hallervorden

[1] Supplied by the Information Service of the Council for Scientific and Industrial Research.

and collaborators. Special Neuropathologic Section of the *Kaiser Wilhelm Institut für Hirnforschung.*

1. Hallervorden: *Über spätfolgen von Hirnschwellung und Hirnödem, nementlich bei Schwachsinnigen und Idioten.* Reprint from *Psychiatrisch-Neurologische Wochenschrift, 41,* Number 2 (1939), 4 pp.

2. Hallervorden, J.: *Kreislaufstörungen in der Ätiologie des angelborenen Schwachsinns. Z. für die gesamte Neurologie und Psychiatrie, 167,* 527 (1939), 24 pp.

3. Hallervorden: *Bericht über die vom Ausschuss für praktische Psychiatrie am 25, März, 1939, in Wiesbaden anlässlich der 5. Jahresversammlung der gesellschaft Deutscher Neurologen und Psychiater Veranstalte Sitzung. Z. für psychische Hygiene, 12,* 121 (1939), 8 pp.

4. Hallervorden, J.: *Die zentralen Entmarkungskrankheiten. Deutsche Z. für Nervenheilkunde, 150,* 201 (1940), 45 pp.

5. Balthasar, K.: *Über die Beteiligung des Globus pallidus bei Athetose und Paraballismus. Ibidem, 148,* 244 (1939), 23 pp.

6. Krücke, Wilhelm: *Die mucoide Degeneration der peripheren Nerven. Virchow's archiv für pathologische Anatomie und Physiologie und für klinische Medizin, 304,* 442 (1939) 26 pp.

7. Voland, Walter: *Über intracerebrale Gefass-Verkalkungen. Archiv für Psychiatrie und Nervenkrankheiten. 111,* 5 (1940), 47 pp.

8. Noetzel, H.: *Diffusion von Blutfarbstoff in der inneren Randzone und äussern Oberfläche des Zentralnervensystems bei subarachnoidaler Blutung. Ibidem, 111,* 129 (1940), 14 pp.

9. Laubenthal, F., and Hallervorden, J.: *Über ein Geschwisterpaar mit einer eigenartigen frühkindlichen Hirnerkränkung nebst Mikrocephalie und über seine Sippe. Ibidem, 111,* 712 (1940), 34 pp.

10. Eicke, Werner-J.: *Neue Beobachtungen über die Hallervorden-Spatzsche Krankheit. Ibidem, 111,* 514 (1940), 39 pp.

11. Ammermann, Oskar: *Isolierte Schädigung der unteren Oliven bei Myoklonuscpilepsie. Ibidem, 111,* 213 (1940), 24 pp.

12. Lenz, Margot: *Hirnveränderungen nach einem 10 Monate vor dem Tode vorgenommenen Erwürgungsversuch.* Thesis, *Friedrich-Wilhelms-Universität zu Berlin,* August 14, 1940, 22 pp. (1 page illegible).

13. Hallervorden, J.: *Hirnerschütterung und Thixotropie. Zentr. für Neurochirurgie,* Number 1-2, 37 (1941), 6 pp.

14. Birnbaum, Günter.: *Chronische-progressive Chorea mit Kleinhirnatrophie. Archiv für Psychiatrie und Nervenkrankheiten, 114,* 160 (1941), 27 pp.

15. Eicke, Werner-J.: Wilson-*Pseudosklerose ohne Lebercirrhose. Ibidem, 114,* 214 (1941), 48 pp.

16. Götze, Wolfgang, and Krücke, Wilhelm: *Über Paramyloidose mit besonderer Beteiligung der peripheren Nerven und granulärer Atrophie des Gehirns, und über ihre Beziehungen zu den intracerebralen Gefässverkalkungen. Ibidem, 114,* 183 (1941), 35 pp.

17. Krücke, Wilhelm: *Ödem und seröse Entzündung im peripheren Nerven. Virchow's Archiv für pathologische Anatomie und Physiologie und für klinische Medizin, 308,* 1 (1941), 17 pp.

18. Krücke, Wilhelm: *Zur Histopathologie der neuralen Muskelatrophie, der hypertrophischen Neuritis und Neurofibromatose. Archiv für Psychiatrie, 115,* 180 (1942), 57 pp.

19. Volland, W.: *Beitrag zur Kenntnis der Gehirnschäden bei Trichinose. Ibidem, 115,* 349 (1943), 15 pp.

20. Hallervorden, J.: *Die pathologisch-anatomischen Veränderungen im Zentralnervensystem beim Fleckfieber. Der Deutsche Militärarzt, 8,* 26 (1943), 5 pp.

21. Eicke, Werner-J.: *Beitrag zur Pathologie der Substantia nigra. Archiv für Psychiatrie, 115,* 549 (1943), 17 pp.

22. Hallervorden: Schob, Franz, 1877-1942. Obituary. *Ibidem, 116,* 347 (1943), 5 pp.

23. Hallervorden: *Encephalitis und Polyneuritis. Der Nervenarzt, 16,* 417 (1943), 12 pp.

24. Eicke, Werner-J.: *Zur Frage der fetalen Encephalitis, Meningitis und ihren Folgeerscheinungen. Archiv für Psychiatrie, 116,* 568 (1943), 26 pp.

25. Hallervorden, J.: Bericht, 1940-1941. Typewritten manuscript. 14 pp. Brief summary report of work done during period indicated.

26. Hallervorden, J.: Bericht, 1941-1942. Typewritten manuscript. 14 pp. Brief summary report of work done during period indicated.

27. Hallervorden, J.: *Bericht über Operationsmaterial aus dem Reserve-Lazarett* 127, Berlin-Buch. Typewritten manuscript. 4 pp.

28. Hallervorden: *Oligodendrogliom nach Hirntrauma.* Typewritten manuscript. 15 pp.

29. Hallervorden, J.: *Infektiöse Granuloma und "Blastomencephalitis".* Typewritten manuscript. 14 pp. Film is very poor—almost illegible.

30. Hallervorden, J.: *Über multiple und konzentrische Sklerose.* Typewritten manuscript. 27 pp. Film is poor.

31. Volland, W.: *Zur Frage der parainfektiösen (perivenösen) Encephalitis (Impf- und Masern-Encephalitis). Virusinfektion oder allergische Krankheit.* Typewritten manuscript. 2 pp. (Headed "*Zusammenfassung*".) Film is almost illegible.

32. Eicke, W. J.: *Gefässveränderungen bei Meningitis und ihre Bedeutung für die Pathogenese frühkindlicher Hirnschäden.* Typewritten manuscript. 2 pp. (Headed "*Zusammenfassung*".) Film is almost illegible.

Section B: Reprints and copies of unpublished reports by Kornmüller, Noell and other collaborators in the Physiologic and Electroencephalographic Section of the *Kaiser Wilhelm Institut* for Brain Research. In addition, reprints from Dr. Strughold's and from Dr. F. Jahnel's laboratories.

33. Kornmüller, A.: *Tätigkeitsbericht über die Zeit vom* 1-11-1940 to 1-11-1941. (Activity report for period November 1, 1940, to November 1, 1941.) Typewritten manuscript. 5 pp.

34. Kornmüller, A.: Same for period November 1, 1941, to October 31, 1942. 4 pp.

35. Noell: *Über den Einsatz der hirnelektrischen Untersuchungsmethode in der Luftfahrtmedizin.* 9-22-44. Typewritten manuscript. 4 pp.

36. Kornmüller, A. E., and Janzen, R.: *Hirnbioelektrische Untersuchungen bei genuiner Epilepsie. Deutsche Z. für Nervenheilkunde. 152,* 78 (1941), 31 pp.

37. Kornmüller, A. E., Palme, F., and Strughold, E. H.: *Über Veränderungen der Gehirnaktionsströme im akuten Sauerstoffmangel. Luftfahrtmedizin. 5,* 161 (1941), 27 pp.

38. Kornmüller, A. E.: Hans Berger. Obituary. *Münchener medizinische Wochenschrift,* Number 32, 889 (1941), 4 pp.

39. Kornmüller, A. E.: *Zur Pathogenese der genuinen Epilepsie und anderer Anfallskrankheiten auf Grund hirnelektrischer Befunde. Archiv für Psychiatrie und Nervenkrankheiten. 114,* 25 (1941), 27 pp.

40. Kornmüller, A. E., Palme, F., and Strughold, H.: *Die Ableitung der Gehirnaktionsströme. Eine methode zur Untersuchung der Höhenkrankeit. Klinische Wochenschrift. 21,* 1 (1942), 8 pp.

41. Kornmüller, A. E.: *Die Wirkung der Kohlensäure bei Epilepsie und Schizophrenie auf Grund hirn electrischer Befunde. Münchener medizinische Wochenschrift,* Number 2, 30 (1942), 11 pp.

42. Noell, W., Kornmüller, A. E., and Gremmler, J.: *Über den "Paradoxeffect der Sauerstoffgabe". Archiv für Psychiatrie. 116,* 395 (1943), 24 pp.

43. Kornmüller, A. E.: *Die klinische Bewertung der Elektrencephalogramme. Ibidem, 116,* 608 (1943), 41 pp.

44. Baranovski, Peter: *Zur Frage der Veränderung des Wasserhaushaltes bei der experimentellen Epilepsie an Tieren. Klinische Wochenschrift. 23,* 21 (1944), 2 pp.

45. Kornmüller, A. E., and Gremmler, J.: *Praepileptische Zeichen in Elektrenkephalogrammen von Kopfverletzen. Ibidem, 23,* 22 (1944), 2 pp.

46. Kornmüller, A. E., and Noell, W.: *Über den Einfluss der Kohlensäurespannung auf bioelektrische Hirn indenphänomene. Pflüger's Archiv für die gesamte Physiologie des Menschen und der Tiere. 247,* 660 (1944), 26 pp.

47. Noell, W., and Kornmüller, A. E.: *Zur Sauerstoffmangelwirkung auf die Hirn rinde. Ibidem, 247,* 685 (1944), 28 pp. Part of film is very poor.

48. Kornmüller, A. E., and Noell, W.: *Zur Frage der Beeinflussungder Sauerstoffmangelwirkung durch Kohlensäure. Ibidem, 247,* 713 (1944), 10 pp.

49. Kornmüller, A. E.: *Einführung in die klinische Elektrenkephalographie.* 1944. (Book.) 147 pp. 65 illustrations.

50. Noell, W., and Schneider, M.: *Die Gehirndurchblutung bei Sauerstoffmangel und bei Übergang von Sauerstoffmangel auf reinen* O_2 *und auf* O_2-CO_2-*Gemische. Luftfahrt medizin. 5,* 234 (1941), 23 pp.

51. Noell, W., and Roeder, W.: *Zur Erholung aus Sauerstoffmangel, insbesondere über den Paradoxeffekt der Sauerstoffgabe. Ibidem, 8,* 339 (1943), 18 pp.

52. Noell, W., and Schneider, M.: *Über die Flimmerbereitschaft des Herzens in der Erholung nach schwerstem Sauerstoffmangel. Z. für die gesamte experimentelle Medizin. 113,* 270 (1943), 13 pp.

53. Gremmler, J.: *Die Beziehungen der Hypoxämie zum epileptischen Anfall und zu den Höhenkrämpfen. Der Nervenarzt. 15,* 467 (1942), 10 pp.

British Medical Association News.

NEW SOUTH WALES BRANCH NEWS.

Rehabilitation of Medical Officers Demobilized in New South Wales.

The following statement is published at the request of the Medical Secretary of the New South Wales Branch.

Upon the repeal of the National Security (Medical Coordination and Equipment) Regulations in April last, when the Medical Coordination Committees ceased to function, a committee was appointed by the New South Wales Branch of the British Medical Association to assist medical officers being released from the services to reestablish themselves in civil practice. This committee acts in an advisory capacity, and the chairman, Dr. George Bell, is available to discuss their individual problems with any ex-service medical officers who may seek his advice. It also serves as a liaison between doctors requiring assistants or partners and ex-servicemen desiring such positions.

A survey has been made, based on the records of the Medical Services Advisory Committee (as at September 11, 1946), regarding the civil occupations of medical officers released from the services during the years 1944, 1945, and up to June 30, 1946. According to this information, 666 medical officers were released during the period mentioned—119 during 1944, 137 during 1945, 235 during the first quarter of 1946, and 175 during the quarter ended June 30, 1946. (The figures quoted do not include any medical officers who were on prediscbarge leave on June 30, 1946.) Of those released during 1944, 100 have entered private practice, thirteen have taken full-time salaried positions, and four are doing full-time post-graduate work. One hundred and eleven of those released during 1945 have been absorbed into private practice, nine have obtained full-time salaried positions, and thirteen are doing post-graduate work. Of those released during the first quarter of 1946, 156 have taken up private practice, 38 have obtained full-time salaried positions, and 32 are doing post-graduate work. One hundred and eighteen of those released during the quarter ended June 30, 1946, have entered private practice, eight have taken full-time salaried positions, and 42 are doing post-graduate work.

Summing up the position, 644 of the 666 men released during the period in question were fully employed in some type of medical work on September 11, 1946. Among those not actively employed were men who were in indifferent health, including some ex-prisoners-of-war, and medical practitioners who would have retired, under normal circumstances, owing to age. It should, of course, be realized that the majority of those released during 1944 and 1945 were released at the request of the Medical Coordination Committee to supply essential medical services to the civil community, and to reinforce the ranks of the hard-pressed civilian practitioners. Many of them were men who had relinquished their practices in order to enlist, and only resumed civil life when it was pointed out to them that in this way they could most usefully serve their country.

The success of rehabilitation in New South Wales has, of course, been brought about by the coordinated efforts of a number of organizations, in particular, the New South Wales Medical Coordination Committee, the New South Wales Branch of the British Medical Association, the Post-Graduate Committee in Medicine in the University of Sydney, and the Services Medical Officers' Association of New South Wales. Medical superintendents and many secretaries of hospitals in this State have been most helpful in assisting the Medical Coordination Committee, and later the Medical Services Advisory Committee, by making resident positions available to ex-servicemen.

Probably the most important factor, however, in bringing about this rapid rehabilitation has been the helping hand extended by individual members of the medical profession to their colleagues in the services by assisting them to reestablish themselves in civil life. They have shown a fine example of what can be done by one section of the civilian community when it sets out to help its ex-service members, and attempts to repay some part of the debt which it owes to the men and women of the services.

Naval, Military and Air Force.

APPOINTMENTS.

The undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 182, of September 26, 1946.

Australian Military Forces.

Australian Army Medical Corps.

15th Australian Camp Hospital.—NX76543 Major F. O. B. Wilkinson is placed upon the Regimental Supernumerary List, 7th June, 1946.

VX81101 Lieutenant-Colonel (Temporary Colonel) G. A. Penington, E.D., relinquishes command of 118th Australian General Hospital and is placed upon the Regimental Supernumerary List, 25th June, 1946.

NX12614 Lieutenant-Colonel C. R. B. Blackburn is transferred to the Reserve of Officers (Australian Army Medical Corps), 6th June, 1946.

To be Temporary Lieutenant-Colonel, 25th June, 1946.—N90615 Major F. N. Lynch, and is appointed to command 101st Australian General Hospital.

VX11415 Colonel N. L. Speirs, C.B.E., V.D., relinquishes the appointment of Deputy Director of Medical Services, Headquarters, Southern Command, and is placed upon the Regimental Supernumerary List, 5th July, 1946.

NX108193 Lieutenant-Colonel (Temporary Colonel) C. R. Cole relinquishes the rank of Temporary Colonel and is transferred to the Reserve of Officers (Australian Army Medical Corps), 28th June, 1946.

The following officers are transferred to the Reserve of Officers (Australian Army Medical Corps): Lieutenant-Colonels NX70286 G. B. D. Hall, 28th June, 1946, and VX108488 M. M. Rosefield, 3rd July, 1946.

NX130933 Major (Temporary Lieutenant-Colonel) T. W. Freeman relinquishes command of 103rd Australian Convalescent Depot and is placed upon the Regimental Supernumerary List, 5th July, 1946.

NX445 Lieutenant-Colonel (Temporary Colonel) E. Ford, O.B.E., relinquishes the rank of Temporary Colonel and is transferred to the Reserve of Officers (Australian Army Medical Corps) with the rank of Lieutenant-Colonel and is granted the honorary rank of Colonel, 25th June, 1946.

The following officers relinquish the rank of Temporary Lieutenant-Colonel and are transferred to the Reserve of Officers (Australian Army Medical Corps): Majors (Temporary Lieutenant-Colonels) VX51843 K. B. Brown, 22nd June, 1946, and WX3469 S. L. Mainland, O.B.E., 29th June, 1946.

SX1433 Lieutenant-Colonel W. D. Brummitt is transferred to the Reserve of Officers (Australian Army Medical Corps), 27th June, 1946.

To be Temporary Major, 4th July, 1946.—SX23066 Captain P. G. Jay.

No. 113 (Concord) Military Hospital.—NX202336 Captain D. L. Thomas is transferred from the Permanent Supernumerary List (Australian Army Medical Corps), 10th July, 1946.

28th Australian Camp Hospital.—VX96335 Captain J. J. Bourke is placed upon the Regimental Supernumerary List, 18th June, 1946.

VX114275 Lieutenant-Colonel (Temporary Colonel) J. J. Black, D.S.O., V.D., relinquishes command of 106th Australian General Hospital and is placed upon the Regimental Supernumerary List, 1st August, 1946.

N78718 Lieutenant-Colonel N. M. Gibson, O.B.E., relinquishes command of 120th Australian Special Hospital and is placed upon the Regimental Supernumerary List, 1st August, 1946.

WX33057 Lieutenant-Colonel (Temporary Colonel) E. J. T. Thompson, M.C., E.D., relinquishes the appointment of Deputy Director, Medical Services Headquarters, 8th Military District, and is placed upon the Regimental Supernumerary List, 1st August, 1946.

NX203548 Captain I. D. Byrne ceases to be seconded, 26th July, 1946.

WX1546 Colonel (Temporary Brigadier) G. B. G. Maitland, D.S.O., D.C.M., relinquishes the rank of Temporary Brigadier and is transferred to the Reserve of Officers (Australian Army Medical Corps) with the rank of Colonel, and is granted the honorary rank of Brigadier, 24th May, 1946.

VX133459 Major (Temporary Lieutenant-Colonel) H. E. Pearce relinquishes the rank of Temporary Lieutenant-

Colonel and is transferred to the Reserve of Officers (Australian Army Medical Corps), 20th July, 1946.

NX475 Lieutenant-Colonel J. L. Holme is placed upon the Retired List with permission to retain his rank and wear the prescribed uniform, 3rd July, 1946.

V5761 Colonel H. H. Turnbull is placed upon the Retired List with permission to retain his rank and wear the prescribed uniform, 19th June, 1946.

To be Colonel, 18th June, 1946.—V5761 Lieutenant-Colonel (Temporary Colonel) H. H. Turnbull.

QX46759 Lieutenant-Colonel (Temporary Colonel) C. E. S. Jackson relinquishes command of No. 102 (Holland Park) Military Hospital and is appointed to command No. 112 (Brisbane) Military Hospital, 19th July, 1946.

QX6437 Lieutenant-Colonel (Temporary Colonel) A. W. L. Row relinquishes command of No. 112 (Brisbane) Military Hospital and is placed upon the Regimental Supernumerary List, 19th July, 1946.

NX139073 Lieutenant-Colonel (Temporary Colonel) J. Leah, C.B.E., relinquishes command of 2nd/11th Australian General Hospital and is placed upon the Regimental Supernumerary List, 19th July, 1946.

VX38970 Colonel (Temporary Brigadier) N. H. Fairley, C.B.E., relinquishes the appointment of Director of Medicine, Medical "A" Branch, Army Headquarters, and the rank of Temporary Brigadier and is transferred to the reserve of Officers (Australian Army Medical Corps) with the rank of Colonel, and is granted the honorary rank of Brigadier, 4th July, 1946.

VX81101 Lieutenant-Colonel (Temporary Colonel) G. A. Penington, E.D., relinquishes the rank of Temporary Colonel and is transferred to the Reserve of Officers (Australian Army Medical Corps) with the rank of Lieutenant-Colonel and is granted the honorary rank of Colonel, 11th July, 1946.

Lieutenant-Colonels NX35096 E. C. Palmer, O.B.E., and QX24600 J. H. Thorp are transferred to the Reserve of Officers (Australian Army Medical Corps), 22nd June, 1946, and 26th June, 1946, respectively.

To be Temporary Majors.—Captains Q272024 A. H. G. McIntyre and VX94238 F. P. Callaghan, 25th July, 1946, NX204413 P. G. Middleton and NX204019 E. G. Laver, 19th June, 1946, and TX6489 R. W. Henning, 28th June, 1946.

Reserve of Officers.

The undermentioned officers are transferred to the Reserve of Officers with effect from the dates indicated, and, where applicable, cease to be seconded. Officers holding temporary rank relinquish such temporary rank on the date of transfer to the Reserve of Officers:

NX116467 Captain (Temporary Major) K. W. Alexander, 12th June, 1946, and Captains VX88154 A. C. Bell, 12th June, 1946, SX26802 R. W. Klein, 15th June, 1946, and VX63229 A. W. Burton, 5th June, 1946.

2nd/2nd Australian General Hospital.—V146344 Captain P. W. Marshall, 6th June, 1946.

2nd/9th Australian General Hospital.—NX201218 Captain N. S. Powys, 4th June, 1946.

2nd/11th Australian General Hospital.—NX112075 Captain W. M. J. Quinn, 12th June, 1946.

2nd/14th Australian General Hospital.—QX30151 Captain R. B. Salter, 13th June, 1946.

101st Australian General Hospital (Australian Imperial Force).—N278494 Major W. H. Cook, 7th June, 1946, and NX200465 Captain L. C. A. Ariotti, 31st May, 1946.

No. 102 (Holland Park) Military Hospital.—Captains QX61256 B. P. McMenamin and QX59746 H. S. Patterson, 19th June, 1946.

107th Australian General Hospital.—VX102754 Captain (Temporary Major) R. F. Lowe, 19th June, 1946.

No. 112 (Brisbane) Military Hospital.—QX49117 Major A. V. Henry, 30th May, 1946.

No. 113 (Concord) Military Hospital.—Majors NX71093 E. W. Sibree, NX76540 S. D. Allen and NX112687 A. M. Bryson, 7th June, 1946, and NX147273 Captain R. M. Dey, 13th June, 1946.

No. 115 (Heidelberg) Military Hospital.—VX63929 Major W. McI. Rose, 12th June, 1946, and Captains TX6483 L. A. Fitzpatrick, 12th June, 1946, VX39063 R. H. L. Dunn, 6th June, 1946, VX65360 N. G. Elder, 14th June, 1946, and VX108029 P. J. Robinson, 12th June, 1946.

121st Australian General Hospital (Australian Imperial Force).—Captains SX26054 F. A. Dibden, 8th June, 1946, and SX29978 G. A. Hunter, 20th June, 1946.

12th Australian Camp Hospital.—NX205054 Captain H. L. Kesteven, 13th June, 1946.

14th Australian Camp Hospital.—NX144824 Captain J. R. Elliott, 1st June, 1946.

28th Australian Camp Hospital.—VX94086 Captain E. A. Briglia, 7th June, 1946.

77th Australian Camp Hospital.—VX92587 Captain M. R. Millikan, 5th June, 1946.

3rd Australian Women's Hospital.—NX192311 Major C. A. McDermott, 6th June, 1946.

102nd Australian Convalescent Depot.—QX45095 Captain P. Black, 7th June, 1946.

2nd Australian Out-Patients' Depot.—VX138650 Captain J. B. O'Collins, 5th June, 1946.

2nd/12th Australian Field Ambulance.—NX145405 Captain A. I. Rhydderch, 29th May, 1946.

Army Headquarters Medical Research Unit (Australian Imperial Force).—QX36074 Captain R. H. Black, 6th June, 1946.

2nd Australian Facio-Maxillary Plastic Surgery Unit (Australian Imperial Force).—65511 Captain A. R. Wakefield, 7th June, 1946.

3rd Australian Facio-Maxillary Plastic Surgery Unit (Australian Imperial Force).—QX35075 Major L. S. Davies, 4th June, 1946.

Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).—Captains NX169486 J. Rutherford, 6th June, 1946, NX154819 H. E. Marsden, 12th June, 1946, NX103439 S. St.J. Grace and NX200340 D. H. Cohen, 7th June, 1946, NX104876 R. H. Bonnette, 12th June, 1946, VX104301 C. A. Jones, 4th June, 1946, VX102776 F. R. Phillips and VX102784 K. E. Harrison, 8th June, 1946, V508533 B. J. O'Day, 15th June, 1946, QX45111 C. A. Horn, 19th June, 1946, QX38729 H. W. A. Forbes and QX24533 H. Glynn-Connolly, M.C., 30th May, 1946, QX50148 F. B. Burnett, 14th June, 1946, QX62144 J. C. Moffatt and SX24747 F. J. Laycock, 19th June, 1946, NX77340 P. H. Greenwell, 12th June, 1946, and WX37269 E. C. Wilson, 15th June, 1946.

Captains NX138104 S. A. Horsman, 29th June, 1946, V511467 R. P. Boyle, 28th June, 1946, NX200496 E. F. Coyle, 14th June, 1946, and WX41315 E. N. Nash, 22nd June, 1946.

2nd/11th Australian General Hospital.—NX113209 Major K. T. Hughes and NX77361 Captain O. McC. Spence, 28th June, 1946.

101st Australian General Hospital (Australian Imperial Force).—NX105360 Captain J. R. Sands, 29th June, 1946.

No. 102 (Holland Park) Military Hospital.—Majors VX39654 E. Clarke, 25th June, 1946, and NX34762 J. M. Oldham, 15th June, 1946, and Captains QX53972 I. G. McPhee, 22nd June, 1946, and QX46549 N. A. Sampson, 2nd July, 1946.

No. 110 (Perth) Military Hospital.—WX35833 Captain J. T. Irvine, 27th June, 1946.

No. 112 (Brisbane) Military Hospital.—QX25549 Captain A. F. McSweeny, 22nd June, 1946.

No. 113 (Concord) Military Hospital.—NX153895 Major M. J. J. O'Reilly, 14th June, 1946.

No. 115 (Heidelberg) Military Hospital.—SX12747 Major J. H. Johnston, 3rd July, 1946, and VX102777 Captain G. G. C. McKenzie, 5th July, 1946.

72nd Australian Camp Hospital.—N462691 Captain L. E. Odlum, 26th June, 1946.

107th Australian Convalescent Depot.—VX39316 Major H. L. Andrews, 3rd July, 1946.

109th Australian Casualty Clearing Station (Australian Imperial Force).—VX81060 Captain M. M. Gooey, 26th June, 1946.

2nd/2nd Australian Hospital Ship.—NX202248 Captain C. W. G. Lee, 20th June, 1946.

2nd/15th Australian Field Ambulance.—WX31093 Captain (Temporary Major) A. Breckler, 5th July, 1946.

2nd Australian Field Ambulance (Australian Imperial Force).—NX137564 Major S. B. Clipsham, 14th June, 1946.

Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).—Captains NX172210 F. Rosati, 15th June, 1946, NX105458 R. E. R. Gillespie, 27th June, 1946, NX166837 G. R. Cockburn, 20th June, 1946, NX101918 L. L. Harris and NX178932 W. F. J. Cammack, 19th June, 1946, NX114065 J. J. Smyth and NX115227 N. E. Brand, 29th June, 1946, V506664 L. B. Satchell, 2nd July, 1946, and SX34503 J. W. Rollinson, 5th July, 1946.

Captains QX62247 R. K. Macpherson, 11th July, 1946, VX133088 K. E. Edwards, 9th July, 1946, VX65420 D. G. Phillips, 6th July, 1946, and VX142068 H. I. Jones, 10th July, 1946.

2nd/11th Australian General Hospital.—Majors NX114299 C. H. Horsley and NX70665 M. L. Edwards, 3rd July, 1946, and NX105457 Captain A. McNeil, 5th July, 1946.

101st Australian General Hospital (Australian Imperial Force).—Captains TX6477 E. J. F. de Salis, 12th July, 1946, and TX6476 D. J. Pittar, 3rd July, 1946.

No. 102 (Holland Park) Military Hospital.—NX138347 Major J. I. Tonge, 5th July, 1946, Captains NX200885 P. H.

Wallman, 16th July, 1946, and NX206854 K. R. Gollan, 3rd July, 1946.

No. 105 (Adelaide) Military Hospital.—SX32325 Major J. Andrews, 17th July, 1946, and SX19049 Captain M. Y. Sheppard, 16th July, 1946.

106th Australian General Hospital.—Majors VX148849 W. McL. Smithers, 17th July, 1946, and VX48597 T. E. G. Robertson, 6th June, 1946.

No. 112 (Brisbane) Military Hospital.—Captains Q272853 D. P. H. Schafer, 5th July, 1946, and QX42691 R. Row, 10th July, 1946.

No. 113 (Concord) Military Hospital.—Majors NX113199 T. E. Wilson, 10th July, 1946, NX77362 H. C. Barry and NX77398 H. G. Marsh, 5th July, 1946, Captains NX77377 B. H. Peterson, M.C., 6th July, 1946, NX114067 L. V. Merchant and NX202148 T. H. Lee, 5th July, 1946, NX115346 F. B. Halliday and NX77345 N. R. Scott-Young, 6th July, 1946.

No. 115 (Heidelberg) Military Hospital.—VX63985 Captain R. L. Hodge, 19th July, 1946.

118th Australian General Hospital (Australian Imperial Force).—NX194215 Major W. M. C. MacDonald, 3rd July, 1946.

120th Australian Special Hospital.—NX110240 Captain G. Field, 16th July, 1946.

50th Australian Camp Hospital.—VX63149 Captain F. T. Rose, 9th July, 1946.

2nd/3rd Australian Convalescent Depot.—NX137123 Major M. N. Tinckham, 2nd July, 1946.

104th Australian Casualty Clearing Station (Australian Imperial Force).—VX65416 Captain G. G. Harkness, 9th July, 1946.

2nd/1st Australian Field Ambulance.—VX104320 Major G. A. Goding, 6th July, 1946.

10th Australian Field Ambulance (Australian Imperial Force).—NX76265 Major S. C. Barrett, 13th July, 1946.

Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).—SX13896 Major H. J. Edelman, 6th July, 1946, Captains QX64235 J. E. Trotter, 6th July, 1946, QX48887 H. J. Winterbotham, 4th July, 1946, NX203562 D. H. Rosenman, 5th July, 1946, NX168148 J. E. Aiken, M.C., 2nd July, 1946, VX88155 R. H. Curry, 10th July, 1946, VX104111 R. Kerr, 9th July, 1946, VX90034 D. B. Pitt, 11th July, 1946, VX63930 C. N. De Garis, 9th July, 1946, V515463 A. W. Pound, 10th July, 1946, and TX6320 F. Stegman, 11th July, 1946.

The undermentioned officers are transferred to the Reserve of Officers with effect from the dates indicated, and, where applicable, cease to be seconded. Officers holding temporary rank on the date of transfer to the Reserve of Officers are granted from such date honorary rank on the Reserve of Officers equivalent to the temporary rank relinquished:

2nd/7th Australian Field Ambulance.—NX77171 Captain (Temporary Major) R. J. Hudson, 12th June, 1946.

10th Australian Field Ambulance (Australian Imperial Force).—SX15733 Captain (Temporary Major) M. G. Gratton, 14th June, 1946.

Captains (Temporary Majors) WX11118 N. Rose, 25th June, 1946, and VX108359 B. Widmer, 3rd July, 1946.

VX39525 Captain (Temporary Major) W. Gove, 3rd July, 1946.

Retired List.

The undermentioned officers are placed upon the Retired List on the dates indicated. On the date prior to placement upon the Retired List, where applicable, cease to be seconded. Officers holding temporary rank relinquish such temporary rank on the date of placement upon the Retired List:

2nd/9th Australian General Hospital.—SX26444 Major G. H. Solomon, 8th June, 1946.

2nd/11th Australian General Hospital.—NX103434 Captain (Temporary Major) F. D. Smith, 31st May, 1946.

The undermentioned officers are placed upon the Retired List on the dates indicated with permission to retain their present substantive rank and wear the prescribed uniform, and, where applicable, cease to be seconded. Officers holding temporary rank relinquish such temporary rank on the date of placement upon the Retired List:

SX26733 Captain T. A. R. Dinning, 3rd July, 1946, S36298 Major S. E. Holder, 17th July, 1946.

10th Australian Camp Hospital.—VX91862 Captain B. Clerehan, 18th July, 1946.

7th Australian Field Ambulance.—NX100989 Captain B. R. Scholoffel, 3rd July, 1946.

Permanent Supernumerary List.

NX202336 Captain D. L. Thomas is transferred to Australian Army Medical Corps (Medical), 10th July, 1946.

Reserve Citizen Military Forces.

1st Military District.—Honorary Captain W. D. Ryan is retired, 6th August, 1946.

3rd Military District.—Colonel (Honorary Brigadier) H. G. Furnell, C.B.E., D.S.O., E.D., is appointed Deputy Director of Medical Services, Headquarters, Southern Command (part-time duty), 5th July, 1946.

3rd Military District.—Lieutenant-Colonel (Honorary Colonel) C. W. Ross is appointed Chairman, Medical Equipment Advisory Committee, Army Headquarters (part-time duty), 7th June, 1946.

3rd Military District.—Colonel (Honorary Brigadier) N. H. Fairley, C.B.E., is appointed Honorary Consultant in Tropical Diseases, Army Headquarters, 4th July, 1946.

Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

A Book on Infectious Diseases.

Professor F. M. Burnet's lectures on "Background of Infectious Diseases in Man" have just been published by the Melbourne Permanent Post-Graduate Committee. Problems are "discussed as far as possible from the point of view that each species of pathogenic microorganism has found means to ensure its survival and that the understanding of this process will usually provide means by which the disease concerned can be prevented". This book is available from the Melbourne Permanent Post-Graduate Committee, College of Surgeons, Spring Street, Melbourne. Price: 7s. 6d., post free.

Programme for November.

The programme for November, 1946, arranged by the Melbourne Permanent Post-Graduate Committee is as follows.

Refresher Courses.

Melbourne.—The continuous refresher course, conducted at various hospitals four days a week, will run throughout November, and after that will not be resumed again until February, 1947. Any non-service or service doctors who wish to do so may enrol for November. Surgery demonstrations are given from 10 a.m. till 12 noon, and medical demonstrations from 2 to 4 p.m. Details of subjects are available.

Geelong.—Mr. J. Turner will give a demonstration on "Anal Surgery" at the Geelong Hospital at 8.30 p.m. on Wednesday, November 20. This will complete the 1946 series. The secretary is Dr. Alan Kidd, 216, High Street, Belmont. Telephone: Geelong 2857.

Port Fairy.—Dr. J. Kelly will give a demonstration on "Skin Diseases in General Practice" on Saturday, November 16. The secretary is Dr. G. V. Watson, "Malahide", Camperdown. Telephone: Camperdown 2.

Courses for Higher Degrees and Diplomas.

Melbourne.—Courses for M.D. Part II, F.R.C.S. Part I, M.R.C.O.G. and D.G.O. Part II, D.P.M. Part II, and bacteriology suitable for M.R.C.O.G. and D.G.O., D.L.O., D.O., M.D. and M.S., commenced in September and October and will be continued in November. A course for the D.O. Part II will commence on approximately November 6.

Inquiries regarding courses in Melbourne should be addressed to the Secretary, Melbourne Permanent Post-Graduate Committee, College of Surgeons, Spring Street, C.1. Telephone: JM 1547.

Correspondence.

THE TREATMENT OF FURUNCULOSIS.

Sir: A paper of mine on the above subject in The Medical Journal of Australia, December 1, 1945, page 367, has brought me many letters and inquiries which have made it necessary for me to amplify the matter.

In making the vaccine it is essential to get a large harvest of *Staphylococcus aureus* in as short a time as possible. To

do this the whole of an agar slope should be covered. I and others have found that to spread the pus itself defeats the main object. The best method is to use a fresh agar slope with plenty of condensation water. Pus is taken in a platinum loop about three millimetres in diameter, emulsified in the condensation water which is then smeared all over the surface of the medium. This rarely, if ever, fails to give the desired result.

There is, of course, no limit to the number of slopes inoculated, provided that a heavy suspension is secured in the vaccine. Using the general method indicated and the special technique now described, a large provincial hospital reports complete success in the treatment of 26 consecutive cases.

Yours, etc.,

J. V. Duhig, M.B., F.R.A.C.S.

The University of Queensland,
Medical School,
Brisbane.
September 30, 1946.

SPINAL ANÆSTHESIA AND THE PREGNANT WOMAN.

Sir: Four years ago I had a similar experience to that of Dr. Arthur E. Brown, as the patient collapsed within five minutes of injection of "Metycaine" (10% solution) for spinal anæsthesia for a Cæsarean section. After this catastrophe I have had a series of nineteen cases in which local anæsthesia was used for Cæsarean section. The operation in Case XIX was performed on September 20, 1946. The appendix was removed at the time of the operation. There was a minimum of blood loss, and a blood count was made on the fifth day after operation with the idea of publishing the result. The relevant figures are as follows: the red blood cells numbered 5,590,000 per cubic millimetre, the hæmoglobin value was 105% and the colour index was 0·9. The patient began to feed the infant on the day after operation, was allowed out of bed on the eighth day and left hospital on October 5, 1946. The risk of sudden death on the one hand, and of slow death from shock, hæmorrhage, collapse and sepsis, seems to be eliminated.

This patient's blood was examined to show that blood loss in Cæsarean section is preventible, and that the survey carried out at the Royal Hospital for Women, Paddington, New South Wales (The Medical Journal of Australia, June 15, 1946, page 842), should convert a few progressive obstetricians to operating under local anæsthesia.

Yours, etc.,

J. N. R. Stephen.

97, Mitchell Street,
Stockton,
Newcastle,
New South Wales.
October 7, 1946.

Public Health.

A CONFERENCE OF MEDICAL OFFICERS OF HEALTH AT ADELAIDE.

The Central Board of Health of South Australia announces that a conference of medical officers of health will be held on November 2 and 3, 1946, at the Institute of Medical and Veterinary Science, Frome Road, Adelaide. The chairman of the Central Board of Health is Dr. A. R. Southwood. The conference is being arranged mainly for medical practitioners holding appointments as officers of health to local boards, but the Central Board of Health cordially invites medical practitioners interested in public health to attend the conference. The programme of the conference will be as follows:

Saturday, November 2, 1946.

10 a.m.—Demonstration of modern methods of sewage treatment at Glenelg Sewage Works, arranged by Mr. H. J. N. Hodgson, engineer for water and sewage treatment.

2 p.m.—At the Verco Theatre, Institute of Medical and Veterinary Science: official opening of the conference. Address: "The Medical Profession and the Public Health", by the Honourable A. Lyell McEwin, M.L.C., the Minister of Health.

2.30 p.m.—Discussion on "Streptococcal Infections and their Prophylaxis", opened by Dr. M. E. Chinner.

3.45 p.m.—Discussion on "Aims and Methods in Tuberculosis Control". The opening speakers will be Dr. H. F. Hustler and Dr. O. E. Nichterlein. Dr. Hustler will speak on legal requirements in South Australia and Dr. Nichterlein will discuss the sanatorium and the community.

Sunday, November 3, 1946.

10 a.m.—"D.D.T. and How to Use It", by Dr. George McQueen.

11 a.m.—Discussion on "Puerperal Pyrexia". The opening speakers will be Dr. W. F. Joynt and Dr. F. Boyd Turner. Dr. Joynt will speak on basic principles in controlling puerperal infection, and Dr. Turner will discuss administrative action.

2 p.m.—Symposium: "Laboratory Tests in Public Health." Professor E. R. Trethewie will discuss the role of the laboratory, Miss Nancy Atkinson, M.Sc., will speak on the epidemiology and control of infectious diseases, and Mr. R. A. W. Sheppard, B.Sc., will refer to some bacteriological tests in public health work.

3.15 p.m.—Demonstrations in the pathological laboratory. These will include testing of milk and of water, and investigations into typhoid fever, tuberculosis and streptococcal infections. The demonstrations will be given by Miss Nancy Atkinson and Mr. R. A. W. Sheppard, assisted by Mrs. Draper and Miss Harrington.

Australasian Medical Publishing Company, Limited.

ANNUAL MEETING.

The annual meeting of the Australasian Medical Publishing Company, Limited, was held at The Printing House, Seamer Street, Glebe, New South Wales, on October 14, 1946, Dr. A. M. Davidson in the chair.

Directors' Report.

The report of the directors of the company was as follows.

The directors submit their report for the twelve months ended June 30, 1946, together with the balance sheet as at June 30, 1946, and the profit and loss account for the twelve months ended June 30, 1946.

The number of pages of reading matter in The Medical Journal of Australia was increased during the year, and contributions to the journal were of a high standard.

Despite industrial difficulties and at a later date electric power restrictions encountered by the company, the output of the printing and publishing department was satisfactory. Most of the members of The Printing House staff who were engaged in His Majesty's Forces during the war have resumed duty at The Printing House, but shortage of staff in some of the departments is still a problem.

Depreciation amounting to £806 was written off during the year and the amount of £1,750 was transferred to the reserve for taxation. The company's reserves are used in the business, and we consider the state of the company's affairs is satisfactory.

Provision has been made for the payment of debenture interest for the year ended June 30, 1946.

Sir Henry S. Newland and Dr. D. D. Paton retire from office by rotation in accordance with the Articles of Association (Article 39). They are eligible and present themselves for reelection.

A. M. Davidson,
Chairman.

October 14, 1946.

Election of Directors.

Sir Henry Newland and Dr. D. D. Paton were reelected to the Board of Directors.

Obituary.

HENRY KEBER McWILLIAMS.

We are indebted to Dr. A. E. Rowden White for the following appreciation of the late Dr. Henry Keber McWilliams.

Dr. Henry Keber McWilliams died suddenly of coronary thrombosis on August 18, 1946; had he survived another

week he would have reached his seventy-third birthday. He was born at Drysdale, near Geelong, Victoria, and was educated at the Geelong Grammar School, where he won the Mary Armytage Scholarship which enabled him to become a resident student at Trinity College to pursue his studies in medicine at the University of Melbourne. In his final year he went to Edinburgh, where he obtained the diplomas L.R.C.S., L.R.C.P. He returned to Victoria at the end of last century and practised his profession at Lancefield before going to Mildura in 1911, where he remained until 1930, when after a period of rest he bought Dr. Johnston Thwaites's practice at the corner of Orrong and Malvern Roads, Armadale, which he held until his death.

In August, 1915, he was granted a commission as captain in the Royal Army Medical Corps and left for Egypt and served on the staff of Number 1 Australian General Hospital at Harefield and was promoted to major. After the war he was permitted to do post-graduate work and obtained the diploma of F.R.C.S. (Edinburgh). He joined up in World War II and was sent to Queenscliffe on service.

He was a successful and very popular general practitioner wherever he practised. He possessed a splendid physique and had a robustness of body and mind which made him an admirable companion. He was a good citizen and participated in all matters of public interest. He was a member of the church synod in all the areas in which he practised. McWilliams was a bachelor, and by his death terminates the male descent of one line of the family dating back to William de Burgh, who came to England at the time of the Conquest. King John's castle, Limerick, Ireland, was built by the de Burghs in the reign of King John, and one of his (de Burgh) descendants was the rich Marquis of Clanricarde, who never married, bequeathing his great wealth to Viscount Lascelles. The McWilliam family was therefore a well-known noble family, whose genealogical records in Dublin were unfortunately destroyed by fire one hundred years ago. Henry's father, Andrew McWilliams (Mac means son of William, that is, de Burgh), was a civil engineer who made a flying survey of London in preparation for the railways, which were to be built against much opposition. He left Liverpool at the end of 1851 in the ship *Lucia Maria*, and after a voyage of three months arrived at Henry, Geelong. In his life he carried out much engineering and surveying work in the Geelong District.

Dr. McWilliams is survived by an elder sister, Miss Ellen Maud McWilliams, and a niece, to whom we offer our sincere sympathy for the great loss they have sustained.

GEORGE GATENBY.

We regret to announce the death of Dr. George Gatenby, which occurred on October 15, 1946, at North Sydney.

BASIL DIETHELM.

We regret to announce the death of Dr. Basil Diethelm, which occurred on October 16, 1946, at Sydney.

Corrigendum.

Dr. G. E. M. Scott wishes to correct an error in his paper on "Juvenile Rheumatism: A Survey from the Children's Hospital, Melbourne, with an Addendum on the Follow-Up System of the Almoners of the Hospital" (The Medical Journal of Australia, October 5, 1946, page 469). On page 473, in line 30 of the first column, the words "an unduly accentuated pulmonary first sound" should read "an unduly accentuated pulmonary second sound".

Nominations and Elections.

The undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Cerexhe, Francis Gordon Archer, M.B., B.S., 1945 (Univ. Sydney), Box 2954, G.P.O., Sydney.

Diary for the Month.

Oct. 31.—South Australian Branch, B.M.A.: Scientific Meeting.
Oct. 31.—South Australian Branch, B.M.A.: Council Meeting.
Oct. 31.—New South Wales Branch, B.M.A.: Branch Meeting.
Nov. 1.—Queensland Branch, B.M.A.: Branch Meeting.
Nov. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
Nov. 6.—Western Australian Branch, B.M.A.: Council Meeting.
Nov. 8.—Queensland Branch, B.M.A.: Council Meeting.
Nov. 12.—Meeting of Federal Council, British Medical Association in Australia, Adelaide.
Nov. 12.—Tasmanian Branch, B.M.A.: Ordinary Meeting.
Nov. 13.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
Nov. 13.—Victorian Branch, B.M.A.: Branch Meeting.
Nov. 14.—South Australian Branch, B.M.A.: Council Meeting.
Nov. 19.—New South Wales Branch, B.M.A.: Medical Politics Committee.
Nov. 20.—Western Australian Branch, B.M.A.: General Meeting.
Nov. 21.—Victorian Branch, B.M.A.: Executive Meeting.
Nov. 21.—New South Wales Branch, B.M.A.: Clinical Meeting.
Nov. 22.—Queensland Branch, B.M.A.: Council Meeting.
Nov. 26.—New South Wales Branch, B.M.A.: Ethics Committee.

Medical Appointments: Important Notice.

Medical Practitioners are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

Manuscripts forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to The Medical Journal of Australia alone, unless the contrary be stated.

All communications should be addressed to the Editor, The Medical Journal of Australia, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

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